Über dieses Buch

Dies ist ein digitales Exemplar eines Buches, das seit Generationen in den Regalen der Bibliotheken aufbewahrt wurde, bevor es von Google im Rahmen eines Projekts, mit dem die Bücher dieser Welt online verfügbar gemacht werden sollen, sorgfältig gescannt wurde.

Das Buch hat das Urheberrecht überdauert und kann nun öffentlich zugänglich gemacht werden. Ein öffentlich zugängliches Buch ist ein Buch, das niemals Urheberrechten unterlag oder bei dem die Schutzfrist des Urheberrechts abgelaufen ist. Ob ein Buch öffentlich zugänglich ist, kann von Land zu Land unterschiedlich sein. Öffentlich zugängliche Bücher sind unser Tor zur Vergangenheit und stellen ein geschichtliches, kulturelles und wissenschaftliches Vermögen dar, das häufig nur schwierig zu entdecken ist.

Gebrauchsspuren, Anmerkungen und andere Randbemerkungen, die im Originalband enthalten sind, finden sich auch in dieser Datei – eine Erinnerung an die lange Reise, die das Buch vom Verleger zu einer Bibliothek und weiter zu Ihnen hinter sich gebracht hat.

Nutzungsrichtlinien

Google ist stolz, mit Bibliotheken in partnerschaftlicher Zusammenarbeit öffentlich zugängliches Material zu digitalisieren und einer breiten Masse zugänglich zu machen. Öffentlich zugängliche Bücher gehören der Öffentlichkeit, und wir sind nur ihre Hüter. Nichtsdestotrotz ist diese Arbeit kostspielig. Um diese Ressource weiterhin zur Verfügung stellen zu können, haben wir Schritte unternommen, um den Missbrauch durch kommerzielle Parteien zu verhindern. Dazu gehören technische Einschränkungen für automatisierte Abfragen.

Wir bitten Sie um Einhaltung folgender Richtlinien:

+ *Nutzung der Dateien zu nichtkommerziellen Zwecken* Wir haben Google Buchsuche für Endanwender konzipiert und möchten, dass Sie diese Dateien nur für persönliche, nichtkommerzielle Zwecke verwenden.

+ *Keine automatisierten Abfragen* Senden Sie keine automatisierten Abfragen irgendwelcher Art an das Google-System. Wenn Sie Recherchen über maschinelle Übersetzung, optische Zeichenerkennung oder andere Bereiche durchführen, in denen der Zugang zu Text in großen Mengen nützlich ist, wenden Sie sich bitte an uns. Wir fördern die Nutzung des öffentlich zugänglichen Materials für diese Zwecke und können Ihnen unter Umständen helfen.

+ *Beibehaltung von Google-Markenelementen* Das "Wasserzeichen" von Google, das Sie in jeder Datei finden, ist wichtig zur Information über dieses Projekt und hilft den Anwendern weiteres Material über Google Buchsuche zu finden. Bitte entfernen Sie das Wasserzeichen nicht.

+ *Bewegen Sie sich innerhalb der Legalität* Unabhängig von Ihrem Verwendungszweck müssen Sie sich Ihrer Verantwortung bewusst sein, sicherzustellen, dass Ihre Nutzung legal ist. Gehen Sie nicht davon aus, dass ein Buch, das nach unserem Dafürhalten für Nutzer in den USA öffentlich zugänglich ist, auch für Nutzer in anderen Ländern öffentlich zugänglich ist. Ob ein Buch noch dem Urheberrecht unterliegt, ist von Land zu Land verschieden. Wir können keine Beratung leisten, ob eine bestimmte Nutzung eines bestimmten Buches gesetzlich zulässig ist. Gehen Sie nicht davon aus, dass das Erscheinen eines Buchs in Google Buchsuche bedeutet, dass es in jeder Form und überall auf der Welt verwendet werden kann. Eine Urheberrechtsverletzung kann schwerwiegende Folgen haben.

Über Google Buchsuche

Das Ziel von Google besteht darin, die weltweiten Informationen zu organisieren und allgemein nutzbar und zugänglich zu machen. Google Buchsuche hilft Lesern dabei, die Bücher dieser Welt zu entdecken, und unterstützt Autoren und Verleger dabei, neue Zielgruppen zu erreichen. Den gesamten Buchtext können Sie im Internet unter `http://books.google.com` durchsuchen.

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

https://books.google.com

THE UNIVERSITY
OF ILLNIOIS
LIBRARY
625.05
RLM
v.35
REMOTE STORAGE
ECONOMICS
DEPARTMENT

Digitized by Google

Digitized by Google

Digitized by Google

THE

RAILWAY MAGAZINE

VOL. XXXV.

JULY TO DECEMBER.

1914.

LONDON:
30, FETTER LANE, FLEET STREET, E.C.

Digitized by Google

LONDON :
PRINTED BY SMITHS' PRINTING COMPANY, LTD.,
28-32, HUTTON STREET, WHITEFRIARS, E.C.,
AND FLEET WORKS, ST. ALBANS.

Digitized by Google

625.05
RLM
v.35

INDEX TO VOL. XXXV.

Articles.

		PAGE
Air Compressors in Railway Service		478
Ambulance Trains on British Railways		319, 389
American Freight Locomotives, Recent		433
Antofagasta (Chili) to La Paz (Bolivia)	*S. M. Whitton*,	220, 285
"Bakerloo" Railway Extension to Queens Park		475
Belgian Railway Policy	*W. Parker*	373
Bradford and its Railways	*S. P. Thompson*	54
British Locomotive Practice and Performance	*Cecil J. Allen*	17, 125, 204, 273, 349, 440
"Business as Usual," Railway		315
Caledonian Railway, Pullman Cars on		123
Canadian Northern Railway, Remarkable Vertical Lift Bridge on	*Henry T. Denison*	164
Castleblayney, Keady and Armagh Railway	*H. Fayle*	148
Coal, A Railway Review of the Conquests by		385
Continental Services of English Railways	*Denis O'Donoghue*	24, 103
Craigendoran to Mallaig by Railway	*J. F. Gairns*	59
East Coast Joint Stock, New		153
Electrical Progress and Practice, Railway		463
Exceptional Locomotives in British Design and Practice	*J. Francis*	365, 455
France, Railways in	*W. Parker*	302
Glasgow City and District Railway	*Charles C. Littlejohn*	49
Great Central Railway: Duklnfield Carriage and Wagon Works	*J. F. Gairns*	417
Great Central Railway: Gorton Locomotive Works	*J. F. Gairns*	333
Great Eastern Railway and Lowestoft	*F. C. Warren*	297
Great Eastern Railway: Train Service Metamorphosis		359
Goods Warehouses, Railway	*W. F. Lawrence*	195
Heysham, Metamorphosis of	*R. Lendrum-Ainslie*	213
Hull, King George Dock at		112
Isle of Wight, The Railways of the	*H. M. Alderman*	37
"Little England beyond Wales," The Railways of	*G. W. J. Potter*	65, 139
Locomotive Engineer, Leaves from the Log of a *Robert Weatherburn*		32, 143, 230, 292, 380, 451
London and North Western Railway and Liverpool	*Basil Mercer*	181
London and North Western Railway Road Motor Services		161
London and North Western Railway Electric Rolling Stock		309
London and North Western Railway Locomotives Fitted with Sand Shields		311
London and North Western Railway: Wolverton Carriage Works	*J. F. Gairns*	253
London, Brighton and South Coast Railway in East Sussex	*J. Francis*	157, 226
Motor Road Traction, Railway Companies and		470
Newport, Alexandra Docks: Opening New Lock Entrance		119
North Staffordshire Railway, Electric Machinery and Appliances on	*C. Dean*	8
Notable Railway Stations and Their Traffic—King's Cross: Great Northern Railway	*J. F. Gairns*	93
Official Changes in the Home Railway World		394
100-Mile Runs in 1914		232
Restall's Trips	*W. Parker*	235
South Africa, Railway Travelling in		312
South Eastern and Chatham Railway, Long Distance Travelling on the	*J. G.*	45
Suffolk Coast and its Railways		69
Summer Train Services		75
Vale of Neath Railway	*Herbert Rake*	377
Wirral Railway, The	*Basil Mercer*	1

Frontispiece Plates.

Glasgow and South Western Railway: Restaurant Car Express	*Facing*	253
Great Central Railway: Restaurant Car Express. 4–4–0 Locomotive, No. 434	,,	333
Great Central Railway: "Sheffield Special" Restaurant Car Express	,,	1
Great Eastern Railway: Norfolk Coast Express	,,	93
Great Northern Railway: Down Leeds and Bradford Luncheon Car Express	,,	181
South Eastern and Chatham Railway: New British-built 4–4–0 Superheater Locomotive, No. 764	,,	417

Locomotive Illustrations.

American (United States)	31, 433, 434, 435, 436, 437
Australian (Queensland)	380
,, (Tasmania)	460
Bolivian	289
Burman	458
Chinese	368
Dublin and South Eastern	203
French	302, 308
Furness	276, 283
Great Central	346, 347, 348
Great Eastern	18, 19, 69, 447
Great Northern	64, 127
Great Southern and Western	281, 282

348505

Digitized by Google

PAGE

Indian 370, 458
Industrial (Greece) 371
Isle of Wight Central 37, 39
Japanese 372
London and North Western 311
London, Brighton and South Coast 130
Manila 461
Mexican 456
Midland (N.C.C. Section) 496
Midland Great Western (Ireland) 136
North British 7
North Eastern 172
North Staffordshire 442
Russian 453
South American 367, 369, 459
South African 366, 457
South Eastern and Chatham 166
Staughton Manor (Miniature) 92
Wirral 6

Miscellaneous.

Canadian Pacific Railway: Mr. George M. Bosworth, Vice-President 73
Cheshire Lines Committee: Train of New Vehicles 84
Coal for Shipment 348
Côtes du Nord Railway of France: St. Brieux-Portrieux Train at Binic 229
Erie Railroad: 2-8-8-8-2 "Triplex" Articulated Locomotive 31
Great Central Railway: New 2-6-4 Tank Engine 348
Great Northern Railway: Superheater Side Tank Locomotive 64
Liverpool and Manchester Railway, Early Rolling Stock used on 388
London and North Western Railway New Officers 397
Manufacturer's Miscellany 416
Midland Railway (N.C.C. Section) 4-4-0 Superheated Locomotive 496
North Eastern Railway: New 3-cylinder Superheater Atlantic Locomotive 172
Picturesque, Railways and the 156
Sir Albert Stanley, Presentation to 238
South Eastern and Chatham Railway: New Express Locomotives 166

Pertinent Paragraphs 82, 167, 240, 323, 398, 487

Railway Engineering and Equipment 481

Railway Literature 74, 180, 252, 314, 500

Railway Portrait Gallery.

Mr. J. Adey, Dukinfield Works, Great Central Railway 419
Mr. Blanden, Station Superintendent, Marylebone, Great Central Railway 330
Mr. G. M. Bosworth, Vice-President, Canadian Pacific Railway 73
Mr. J. H. Burns, General Traffic Manager, Wirral Railway 2
Mr. Guy Calthrop, General Manager, London and North Western Railway 395, 432
Mr. A. D. Cottrell, Clerk-in-charge, King's Cross Station Booking Office, London, Great Northern Railway 102
Mr. H. D. Earl, Carriage Superintendent, London and North Western Railway 256
Mr. C. J. Eastaugh, Stationmaster, Lowestoft Central, Great Eastern Railway 301
Mr. Douglas R. Edge, Dukinfield Works, Great Central Railway 423
Mr. David Edmunds, Joint Collector, Cardiff Railway 396
Mr. E. C. Grindley, London and North Western Railway 488
Mr. L. W. Horne, Superintendent of Line, London and North Western Railway 487
Mr. T. B. Hunter, Locomotive Superintendent, Wirral Railway 2
Mr. W. H. Kemp, Stationmaster, King's Cross Station, London, Great Northern Railway 102
Mr. Henry Lander, late Senior Joint Collector, Cardiff Railway 396
Mr. H. E. Lord, Dukinfield Works, Great Central Railway 421
Mr. W. G. Percy Maclure, Locomotive Running Superintendent, Great Central Railway 338
Mr. G. H. Mare, Secretary, Association of Regular Kent Coasters 47
Mr. C. L. Mason, Works Manager, Wolverton, London and North Western Railway 257
Mr. E. G. Oliver, Chief Draughtsman, Wolverton Works, London and North Western Railway 257
Mr. Frederick J. Restall, Pioneer of Half-Day Trips from London 235
Mr. John G. Robinson, Chief Mechanical Engineer, Great Central Railway 336
Mr. Andrew F. Rock, Electrical Engineer, North Staffordshire Railway 9
Mr. W. Rowland, Chief Locomotive Draughtsman, Great Central Railway 338
Mr. C. T. Selway, Superintendent of Line, Great Northern Railway 489
Mr. John W. Smith, Works Manager, Gorton, Great Central Railway 338
Mr. T. Spencer, Chief Clerk, Gorton Works, Great Central Railway 338
Mr. R. A. Thom, Assistant to Chief Mechanical Engineer, Great Central Railway 338
Mr. William H. Treatt, Collector of Dues, Cardiff Railway 397
Sir Robert Turnbull, late General Manager, London and North Western Railway 395
Mr. W. M. Turnbull, London and North Western Railway 194, 488
Mr. W. M. Urie, late Works Manager, St. Rollox, Caledonian Railway 174
Mr. E. S. Wilcox, Chief Engineer, Wirral Railway 2
Mr. Horace Wilmer, Chief Engineer, Great Eastern Railway 491

What the Railways are Doing 85, 173, 250, 329, 410, 497

Digitized by Google

Digitized by Google

GREAT CENTRAL RAILWAY:
"SHEFFIELD SPECIAL" RESTAURANT CAR EXPRESS.

Published by "THE RAILWAY MAGAZINE."
Photograph by F. E. Mackay.

Digitized by Google

Digitized by Google

F. Arthur] [*Liverpool.*

MR. T. B. HUNTER.
Locomotive Superintendent.

MR. J. H. BURNS.
General Traffic Manager.

A. D. Stevenson] [*New Brighton.*

MR. E. S. WILCOX.
Chief Engineer.

Digitized by Google

Places of interest on the Wirral Railway are numerous. The commercial interest, though not prominent (the Wirral is pre-eminently a passenger line), is seen at the Birkenhead end of the line, where there is communication with the lines of the Mersey Docks and Harbour Board.

Commencing a journey at Seacombe, we pass these junctions and the western end of the "Great Float," upon which are situated the magnificent Birkenhead Docks. Passing through Liscard and Poulton, the wooded slopes of Bidston Hill appear, as also does the somewhat *maigre* Bidston station. On the summit of the hill is the Northern Observatory, and it is said that the telescope through which the Transit of Venus was first observed is preserved in the building. Leasowe Castle, sometimes called "Mockbeggar Hall," next claims attention. It was built in 1593 by Ferdinando, Earl of Derby, and in the sixteenth century was a place of importance; a race course was laid out near by upon which the first "Derby" took place. Indeed, the Wallasey Stakes are still in the bill at Epsom. To-day the buildings are in the hands of the Trustees of the Railwaymen's Convalescent Homes, a most excellent and well-managed institution, also maintaining the older "Home" at Herne Bay in Kent. The antiquary may find in the vicinity a submarine forest, and, which is of more consequence to the majority, the beach is excellent for bathing; this last, indeed, is common to most places on the Wirral Railway.

We next come to Moreton and Meols, growing townlets on a coast which is famous for its "winds that blow from the south," or rather, south-west, which winds are predominant for ten out of the twelve months. The railway now takes a south-westerly direction, and brings us to Hoylake. Here the Deeside shores may be said to begin, and here may be witnessed the wonderful Turneresque sunsets for which the locality is famous. Hoylake may also be called the mother home of the "royal and ancient game of golf," and within its demesne are situated the links of the Royal Liverpool Golf Club. Nor are archæological interests wanting. Accessible at low water is the Island of Hilbre, mentioned in Domesday Book and site of a monastery founded in one of his better moments by King John. In the 16th and 17th centuries Hoylake was an important port, the bulk of the trade between England and Ireland being carried on there. It was the point of William the Third's departure for the Emerald Isle in 1690.

West Kirby, which is the *ultima thule* of the Wirral Railway, is round the corner, and overlooks the extensive Sands of Dee, where Mary in the old song went "to call the cattle home." Owing to its situation and to the ozone from the aforesaid sands, West Kirby is one of the most beneficial spots in England for anyone needing the open air cure. It is a cheerful little town with plenty going on, while the view from the hills behind the town is a treat for the jaded town-dweller, embracing as it does the Bay of Liverpool and the Dee Estuary, while the mountains of North Wales form a striking background.

The other section of the Wirral Railway is shorter but equally important. Leaving the West Kirby line before we come to Bidston station, the train heads northwards and enters the district of Wallasey, which is served by two stations. This "ancient village" of the old chronicles has a splendid shore on the open Irish Sea, and is a favourite residential place. Turning in an easterly direction and running along the picturesque littoral, New Brighton is reached. This place, which is known all over the world as a pleasure resort, and is a favourite suburb of the Liverpolitans, almost rivals Blackpool in its lavish provision of entertainments, while not the least of its charms is the ever-varying panorama of the sea-borne traffic of Liverpool. From the Mersey frontage we may see such famous leviathans as the *Mauretania* and *Aquitania*, to mention only two among many, while the *Ben-my-Chree*, of the Isle of Man Steam Packet Company, and the Liverpool and North Wales steamer, the famous *La Marguerite*, are also features of interest. And yet the place is not at all spoilt in spite of the millions of trippers who visit it; fine houses with well-kept gardens grace the promenade, while the resident has choice of either sea or river view.

The history of the Wirral Railway goes back to 1863, when the Hoylake Railway Company was incorporated, with powers to make railways from Birkenhead and Poulton to Hoylake. In 1865 further extensions were authorised, to New Brighton and Parkgate, but the full powers were not then exercised. Changes took place a few years later, in 1872, when the Hoylake and Birkenhead Rail and Tramways Company was founded to acquire the lines of the Hoylake Company. In the following year, 1873, powers were obtained to make an extension to West Kirby, and to make a short line at the

Digitized by Google

Arthur Shaw] [*Seacombe.*

NEW BRIGHTON STATION.

Arthur Shaw] [*Seacombe.*

WEST KIRBY STATION.

Arthur Shaw] [*Seacombe.*

BIRKENHEAD DOCK STATION.

Arthur Shaw] [*Seacombe.*

WALLASEY STATION.

Digitized by Google

Birkenhead end connecting the Dock lines of the Mersey Dock and Harbour Board.

In 1881, powers were obtained to change the name of the Company to the Seacombe, Hoylake and Deeside Railway Company, and to make an extension to Seacombe. The latter powers were not, however, exercised until some years later, the extension to Seacombe being opened in 1895. The terminus, since re-named Seacombe and Egremont, is situated close to the ferry to Liverpool. A further extension from Wallasey to New Brighton was opened in 1888.

The Wirral Railway Company was incorporated in 1883, and by the Acts of 1884, 1885 and 1888 was authorised to construct railways in the county of Chester connecting with the Great Central near Connah's Quay; the existing Seacombe, Hoylake and Deeside Railways, and the Mersey Railway.

The partially completed line from Bidston to Connah's Quay was, by the Act of 1889, transferred to the joint ownership of the Great Central and Wirral, Mersey and Connah's Quay Railways. The connection with the Mersey Tunnel Railway at Birkenhead Park station was opened in 1888. In 1891 the various undertakings were amalgamated under the name of the Wirral Railway Company.

As mentioned before, there are two routes from Liverpool to the Wirral stations. The Seacombe ferry steamer from the landing stage at Liverpool connects with the West Kirby service, the journey, including the change from boat to train, taking only 33 minutes. Seacombe station is also the place of departure for Great Central trains to Chester and Wrexham. The other route, *viâ* the Mersey Railway and Birkenhead Park, serves both sections of the Wirral Railway, the electric trains of the former conveying the passenger through the great tunnel, now happily free from mephitic vapours. By this route West Kirby is 28 minutes from Liverpool, the journey to New Brighton taking 21 minutes.

The Wirral Railway derives the bulk of its revenue from passengers, the amount received from goods being only a fifth of that from passenger traffic, albeit there are important goods connections at Birkenhead Docks. With, however, a short mileage, fourteen miles in all, and that mainly to rising residential places, it is not surprising that this should be the case.

Coming to the equipment of the line, we find a high standard of maintenance. All of the mileage is double track and laid with bull-head rails 30 ft. long, weighing 85 lbs. to the yard. The stations, as may be seen from the illustrations, are neat and adequate, with the exception of Bidston, the dominant colour being a pleasing shade of green. New Brighton, Hoylake and West Kirby are particularly good, especially the last mentioned.

As might be expected from the nature of the country, the uphill work demanded of the engines is not of a serious character. There are, however, a few banks, Liscard being the summit on the Seacombe line, with rises at 1 in 100 and 1 in 150 from that place and 1 in 100 and 1 in 125 on the other side. The approach to New Brighton is a two-mile rise mainly at 1 in 100, terminating with 1 in 88. The West Kirby line is gently undulating and calls for no special effort, except on Bank Holidays, when the train loads provide problems for the engines to solve on all the routes.

The locomotive stud consists of fifteen tank engines, there being six different types. Although there are no tender locomotives, some very interesting examples of construction may be seen. For the goods traffic powerful 0-6-4 engines are employed, with 5 ft. 3 in. driving wheels and 18 in. by 26 in. cylinders; they weigh 62 tons. There is a little 2-4-0 and one of the 4-4-2 type. The Wirral possesses three engines of the interesting and uncommon 4-4-4 wheel arrangement; these are fine machines with a large reserve of power, while their extensive bunker and tank capacity enables them to work long turns when required. These have driving wheels 5 ft. 2 in. diameter, 17 in. by 24 in. cylinders, and a weight of 59¾ tons. The most numerous class of engine on the line is the popular 0-4-4 tank, over half the stock being of this type. A considerably enlarged edition has just been added in the shape of No. 3. This smart engine is a great favourite both with her designer and driver, and the class will probably be added to in the near future. No. 3 has 5 ft. 6 in. driving wheels, cylinders 18 in. by 26 in., and weighs in working order 54½ tons; she is the only engine on the line with a Belpaire firebox, and carries 2,000 gallons of water and 3 tons of coal. One engine remains to be mentioned, No. 4, formerly the property of the London and North Western Railway. As this machine, of the familiar double-ender type with 4 ft. 6 in. driving wheels, is so well-known, mention will suffice without

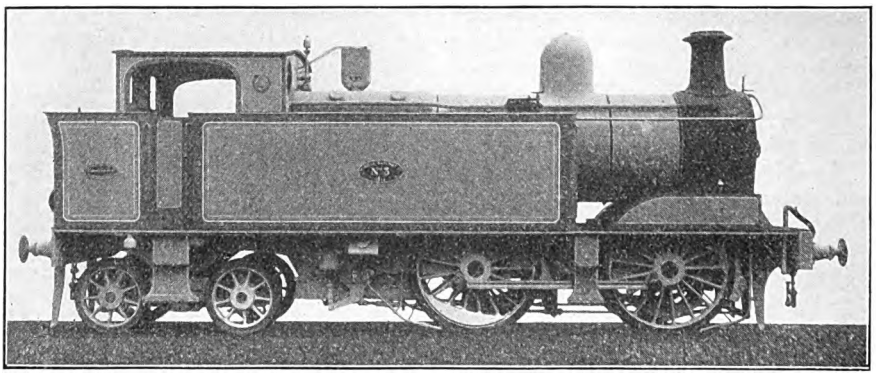
Digitized by Google

description. But it is an interesting change of ownership. All the Wirral locomotives, with the exception of No. 4, have been built by Messrs. Beyer, Peacock & Co., of Manchester.

Turning to the carriage department, we find that the Wirral has taken the lead in one very useful improvement of stock—the mounting of two old coach bodies on a long underframe carried on bogies. It will be remembered that the London, Brighton and South Coast Railway has done a great deal of this kind of work with very beneficial results to the comfort of the passenger. It is, of course, obvious that there are many cases where the body of a four or six-wheel coach differs in no respect from the body of a bogie vehicle belonging to the same company. Of course, in the case of a small line like the Wirral heavy mechanical construction is not undertaken. The underframes for these re-builds came from the Consett Iron Company, and the bogies from Messrs. Pickering. The body work, or what might be called the cabinet-maker's work, is done by the Wirral Company's own men at Hoylake, as also is the painting. The underpart of the coach and the metal work is dealt with at the shops adjacent to Birkenhead Docks station, and the coach is completed at Hoylake. There are several varieties of eight-wheel coaches on the line, from 54 ft. to 59 ft. in length and varying a little in their internal arrangements. There are eight-bodied firsts, coaches with four firsts and four thirds, others with five firsts and four thirds, and some excellent brake thirds having five or seven compartments. There is also a very fine bogie brake composite with two first saloon compartments, one third saloon, one third-class compartment and a brake. The firsts are most artistically decorated, and the whole coach reflects great credit on the Brush Electrical Company, who are the makers. All the above-mentioned stock rides perfectly and compares favourably in this respect with any in England.

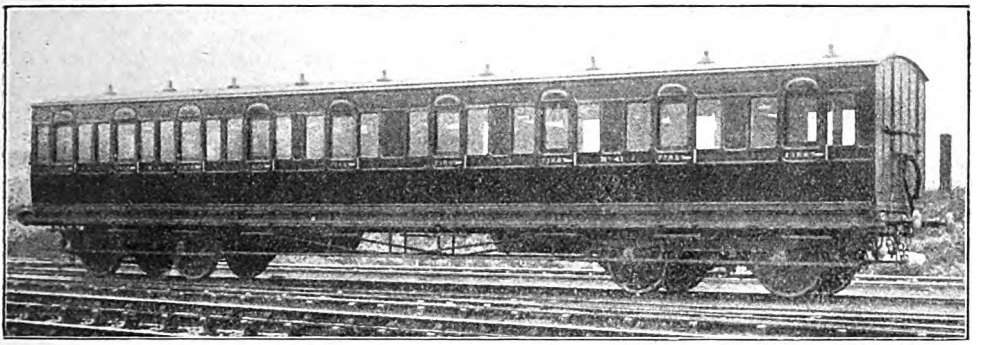
The remainder of the passenger stock is composed of four and six-wheel coaches of the usual type, but with fittings corresponding to the bogie stock, and all in thoroughly good condition. The bulk of the stock has been purchased from the Midland and Mersey Railways, and serves its purpose very well after renovation. Incandescent gas is the illuminant, and the coaches are painted a rich shade of chocolate. The goods rolling stock is of the ordinary type, and is adequate to the needs of the traffic. The engines are painted black and somewhat resemble in finish the locomotives built at Crewe Works.

As we have seen before, the Wirral has important connections with its neighbours. Passenger traffic is exchanged with the Great Western and London and North Western Joint Railway at West Kirby, where there is also a physical connection which is useful for goods traffic. With the Great Central's Wrexham and Chester line the Wirral has close connection, the trains of the former company using the latter's line from Bidston to Seacombe. Trains run in connection with this service and provide Liverpool with an alternate rail access to North Wales. But it is with the Mersey Tunnel Railway that the Wirral has most intimate relations. By means of close connections at Birkenhead Park, the Wallasey and West Kirby districts are brought very close to Liverpool. There is a change of train at Park station, but as there is no change



NEW 0–4–4 TANK ENGINE, RECENTLY PLACED IN SERVICE.

Digitized by Google



Photo] [*Locomotive Publishing Co. Ltd.*

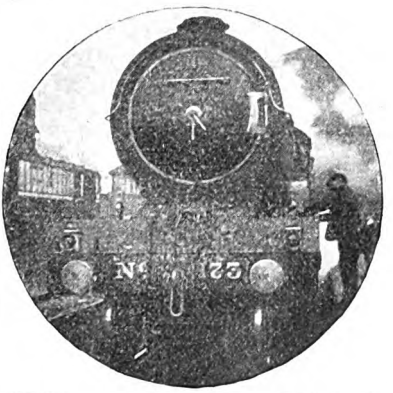
REMODELLED FIRST AND THIRD COMPOSITE CARRIAGE.

of platform the inconvenience is but slight.

This last point brings to our notice the fact that the Wirral has powers to electrify its line. The matter is one for financial experts, but from "information received" it would not be a great surprise to the railway world if this took place within the next decade. When this electrification becomes an established fact it will be possible to have through trains from the Wirral country right into Liverpool over the Mersey Railway. The idea is well within the region of practical politics, for the district is developing by leaps and bounds, and facilities in the shape of increased train services will be demanded to such an extent that electrification will be the only solution of the traffic problem.

An account of the Wirral Railway would be incomplete without mention of the able and energetic Traffic Manager, Mr. J. H. Burns. What Mr. Burns has done for the line is better expressed by reviewing the vast improvements which have taken place under his *regime*. With Mr. Burns' name we may couple those of Mr. T. B. Hunter, the Locomotive Superintendent, and Mr. E. S. Wilcox, the Engineer. We may safely say that the fortunes of the Wirral Railway are in good hands under these three gentlemen, aided as they are by an energetic and courteous staff.

A STRIKING



HEAD-ON VIEW

Photo] [*J. Williams.*

NORTH BRITISH RAILWAY.

4-4-2 locomotive No. 873 *Saint Mungo*.

Digitized by Google

Electric Machinery and Appliances on the North Staffordshire Railway.

By C. DEAN.

(*Electrical Department, North Staffordshire Railway.*)

DURING the twelve years that Mr. Andrew F. Rock has held the position of Telegraph Superintendent and Electrical Engineer of the North Staffordshire Railway considerable advances have been made in the application of electricity to the various purposes of that railway.

Mr. Rock entered the service of the Company in the year 1871 as a telegraph learner, and was transferred to the technical staff in 1876. He rose through various grades to be Chief Electrical Assistant to the late Mr. John Neale, whom he succeeded in January, 1902. In addition to the telegraphs of the Company, Mr. Rock has the supervision of the various electric light and power stations, electric cranes, capstans and lifts, electric lighting of trains, oil tail and side lamps, and both electrical and mechanical clocks.

With regard to telegraphs, the most notable progress is shewn by the remarkable increase in the number of telephones. Of these, there are now about 900 in use over the short length of 206 miles of railway owned by the Company, and the number is constantly increasing. There are also nearly 3,000 other electrical instruments in use, including telegraph and block signalling instruments, with over 10,000 batteries, which are almost exclusively in the form of dry cells. The whole of the line has now been equipped with Tyer's three-position one-wire block instruments, replacing the old two-position instruments. It was anticipated that by the increased use of telephones a considerable reduction would be made in the number of telegrams, but this has not been the case, and last year the total number of messages transmitted by telegraph amounted to 1,390,000, including 166,000 postal telegrams. The Company has for many years given special attention to the encouragement of public telegraph business, and at stations where there are no appointed telegraph clerks gives a premium to station-masters, booking clerks and signalmen, according to the number of such telegrams dealt with by them during each year. The population of many outlying districts is indebted to the Company for telegraph facilities, though such provision usually defeats its own object to some extent in that, as a rule, the Postmaster-General generally comes forward and installs telegraph instruments or telephones in the village post offices immediately the Company has worked up a nice little business, although, in many cases, the residents have previously vainly asked for such a concession.

Much attention is now being given to the control of traffic by telephone, and a system is being evolved which, whilst not so elaborate as those in use on the larger railways, will be more suited to the peculiar needs of the traffic on the North Staffordshire Railway. Track circuits are also being laid down at a rapid rate and very soon all the principal points on the railway will be protected in this manner.

The Company has five electric light and power generating stations. The one at the chief station of the system, Stoke-on-Trent, is situated under the buildings of the down platform, and was brought into use in 1893, the plant then consisting only of one 60 h.p. Davy-Paxman semi-marine boiler, two Bumsted & Chandler 30 b.h.p. single-acting vertical high-speed silent engines, and two Gulcher continuous current 110-volt dynamos, each giving 180 amperes. This plant was soon found to be too small for the requirements of the station, and in 1895

Digitized by Google

another boiler was added, with two additional engines and dynamos of the same description and capacity as those first installed, with the exception that the generators were by Messrs. Johnson & Phillips. In 1903 the demand for light and power had so increased that it was necessary to add further to the plant, and two of the engines and dynamos were taken out, being replaced by two Bumsted & Chandler compound double-acting vertical high-speed engines of 50 and 65 b.h.p. and Royce generators of 35 and 46 kilowatt. A Lancashire 120 h.p. boiler was also fixed in 1908, together with a 69 b.h.p. Bumsted & Chandler engine and Royce 220-volt 46-kilowatt dynamo.

The supply at Stoke-on-Trent station is mostly at 110 volts, but the 220-volt generator is used for lighting the new suite of offices built in 1910 upon the site of the old post office, and for supplying light and power to the sidings, carriage sheds, carriage repair workshops, mortar mills, bridge builders' workshops, etc., at Cockshott, distant about half-mile. There is also a booster consisting of a 15-kilowatt 110-volt motor driving a 110-volt dynamo running in series with a supply from the switchboard, for the purpose of continuing the 220-volt supply when the demand at that voltage does not warrant the running of a separate unit.

The new General Post Office, which is situated upon the station premises, is, by

Photo] *[E. Harrison & Son.*

MR. ANDREW F. ROCK.

Electrical Engineer: North Staffordshire Railway.

Digitized by Google

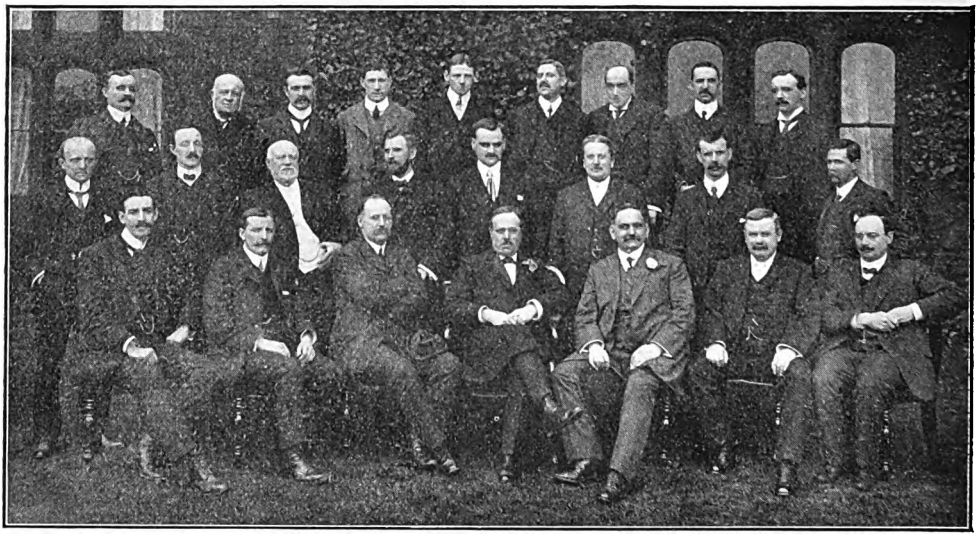
the way, supplied with current by the railway company.

When the electric light was first installed numerous arc lamps were erected. Many of these have been replaced by high candle-power metallic filament lamps, which have proved to be more efficient and economical. The half-watt lamps recently put on the market will probably soon replace the few arc lamps now remaining in use.

The whole of the signal lamps at Stoke-on-Trent station are now lighted by electricity, replacing the usual oil lamps, and this system is being extended over that section of railway between Pratts Sidings and Grange Junction, a distance of about 3½ miles and embracing over 300 signals.

The application of electricity to power at Stoke-on-Trent railway station is not so extensive as might have been the case had not the Company put down, some years before the opening of the electric light and power station, a hydraulic plant for the working of the capstans and hoists at the goods warehouse. An electrical crane, has however, recently been fixed there, and electrical luggage lifts have been fixed on the up and down platforms at the passenger station, giving access to an overhead bridge. A considerable number of motors have also been fixed in the workshops of the various departments, a notable instance being their successful application to two mortar mills, where the most extreme variations of load are experienced.

At the Locomotive Workshops and Round House, situated at Stoke Junction, electric travelling cranes have been erected for the purpose of lifting locomotives. These are supplied with continuous current from the Corporation mains at 480 volts. At the Locomotive Works there are four cranes by Craven Brothers, the motors being by the Lancashire Dynamo and Motor Co. Each crane has separate enclosed multipolar type series-wound reversing motors for hoisting (25 b.h.p.), cross travelling (6½ b.h.p.) and longitudinal travelling (13 b.h.p.). The speeds are as follows:—hoisting, 30 tons at 9 ft. per minute or 12 tons at 18 ft. per minute; cross travelling, full load, 100 ft. per minute; longitudinal travelling, full load, 175 ft. per minute. The motors are controlled from a cage by three tramway type controllers. At the Locomotive Coaling Stage two mechanical cranes have been converted to electrical working by the addition of Royce 5 b.h.p. totally enclosed series-wound reversing motors running at about 600 r.p.m. on the Corporation 480 volt supply.



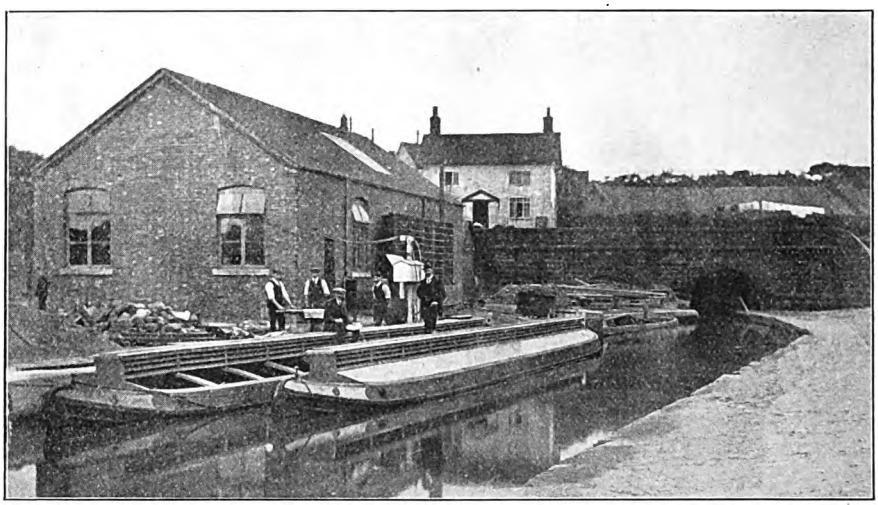
HEADQUARTERS STAFF: ELECTRICAL DEPARTMENT, NORTH STAFFORDSHIRE RAILWAY.

At Hanley goods station the generating plant, the first portion of which was brought into use in 1897, consists of one 30 b.h.p. Premier gas engine and one 27½ b.h.p. Crossley gas engine, working on town gas, with two 22½ kilowatt 110–150-volt General Electric 4-pole dynamos and 58 chloride accumulators.

In addition to the lighting of the goods

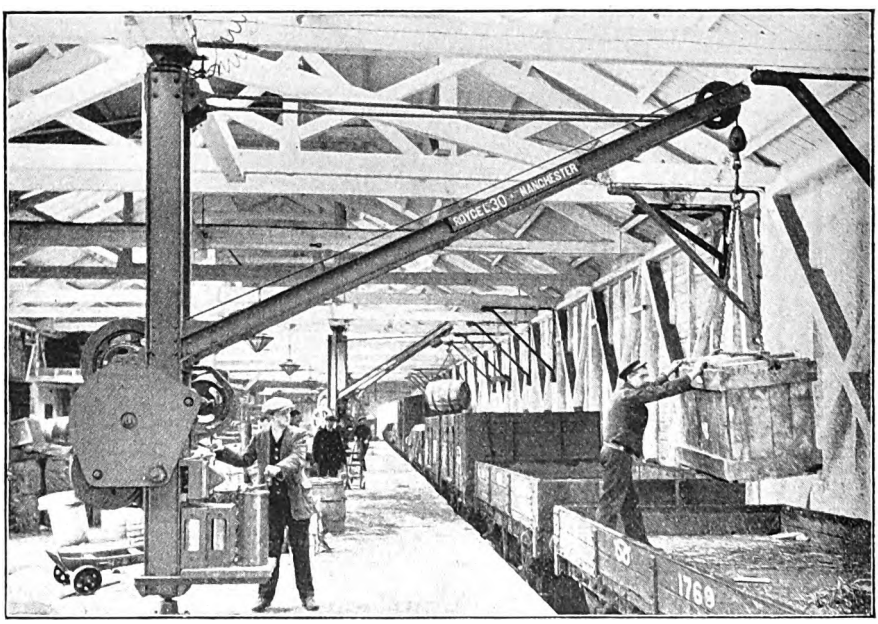
Digitized by Google

Digitized by Google



CHATTERLEY END OF TUNNEL, SHOWING POWER STATION AND ACCUMULATOR BARGES.

carried in a cast iron footstep embedded in concrete at the bottom, and a cast iron bearing at the top, fixed to the roof of the building. The jibs are built up of mild steel channels and flat bars securely braced and rivetted together. The centre post carries the hoisting gear, also the motor and tramway type controller, together with the main switch and fuse. The load of 30 cwts. is lifted by a ½ in. diameter flexible plough steel wire rope, the breaking strain of which is about 8 tons. The hoisting motion is actuated by a 7½ b.h.p. totally enclosed, direct-current compound-wound 4-pole reversing motor, driving, through spur gearing, the cast iron rope barrel which is carried on a mild steel shaft. The slewing is done by pushing the load round by hand. A powerful automatic magnetic brake is applied at all times except when the motor is actually hoisting the load, and this brake is provided with a hand lever for



1½-TON ROYCE JIB CRANE AT LONGPORT.

Digitized by Google

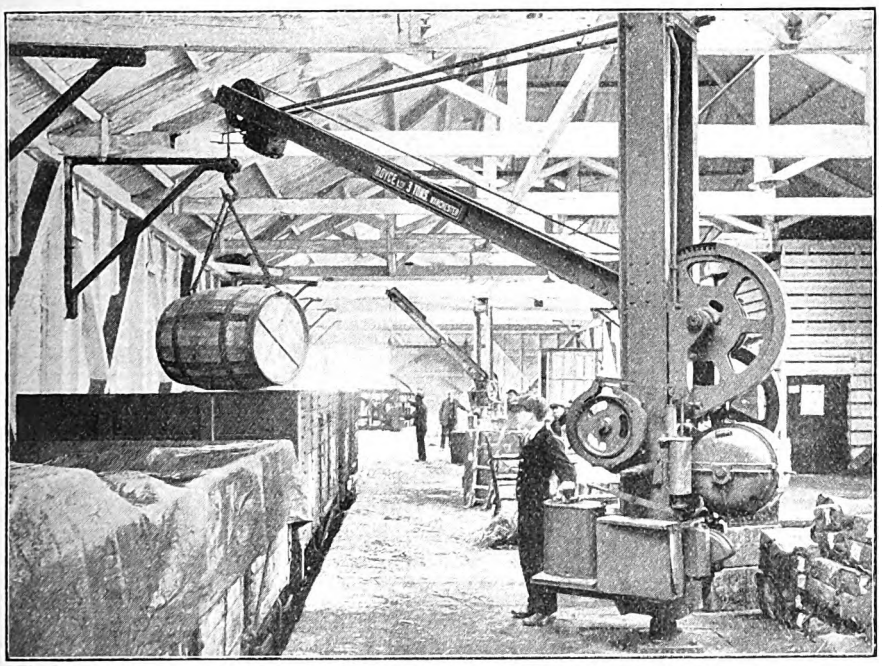
lowering the load by gravity at any required speed. The empty hook is lowered by reversing the motor. There is hand gear for use in case of failure of the motor or of the supply of current.

The Longton station generating plant consists of two 27½ b.h.p. Crossley gas engines, working on town gas, with two 22½ kilowatt 110–150-volt General Electric dynamos and 58 Tudor accumulators. This plant supplies light to the passenger station, goods warehouse, offices and yard, also power to four Royce cranes and five Royce capstans, two of the latter being of the latest pattern fixed steel rope, remote control type. There are also two electric lifts for luggage at the passenger station, but these are worked by current from the Municipal supply.

Uttoxeter station, goods warehouse, sidings, and locomotive shed are supplied by a steam plant consisting of two locomotive type boilers, two Bumsted & Chandler's single acting vertical high-speed engines and two Johnson & Phillips' 110-volt 180-ampere continuous-current dynamos (removed from the Stoke-on-Trent generating station) and 60 Fuller's block accumulators. Further extensions are now being made at this station for the purpose of providing power for working capstans and cranes.

At the Longport goods station six electric cranes and two electric capstans are worked from the Corporation supply, as are two cranes at Tunstall, four capstans at Newcastle-under-Lyme, and four capstans and one crane at Leek. Current is also taken from the Corporation at various places for lighting.

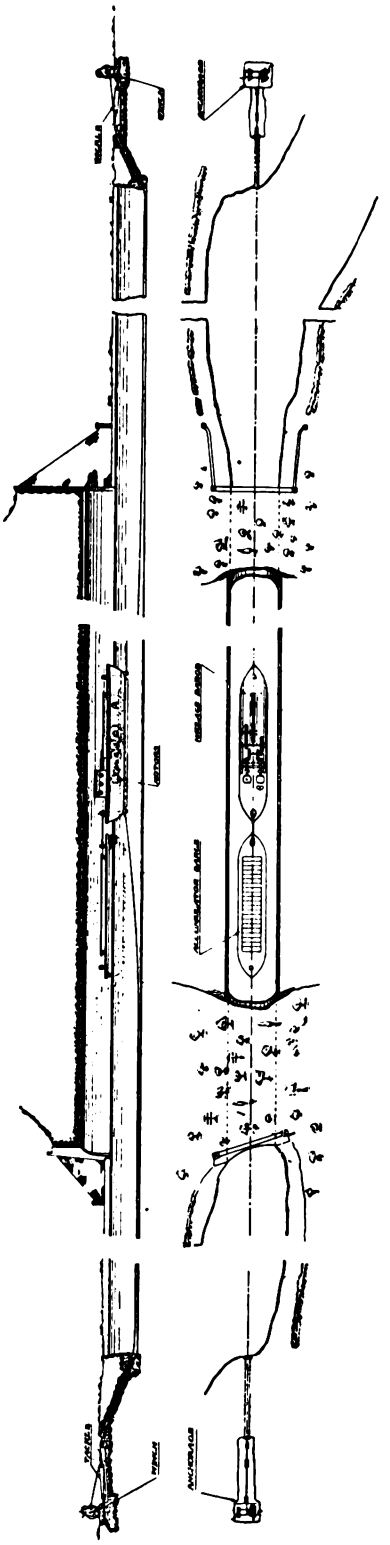
The most recent and interesting application of electricity, however, is in connection with the haulage of boats through one of the two parallel tunnels between Harecastle and Chatterley, on the Trent and Mersey Canal, owned by the North Staffordshire Railway. These tunnels are each about 1¾ miles in length, and form a rather serious hindrance to the very large volume of traffic passing along the canal.



ROYCE 3-TON CRANE IN GOODS STATION, LONGPORT.

The Trent and Mersey Canal, formerly known as the Grand Trunk Canal, was constructed between 1766 and 1777 by James Brindley, and was one of the earliest canals in this country. The total length of the main canal from Preston Brook, where it leaves the Weaver Navigation, to Shardlow, where it joins the River Trent, is 93¼ miles. The branches to Newcastle-under-Lyme, Leek and Froghall, bring up the total to 119 miles. A very large traffic is carried along the canal

Digitized by Google



DIAGRAMMATIC VIEW OF CANAL HAULAGE PLANT.

to and from the Staffordshire potteries and ironworks, consisting chiefly of coal, clay, flint, limestone, iron ore and earthenware. There is also a large traffic in general merchandise, the canal forming an important link in the communication between the Birmingham district canals and Liverpool, also between both those cities and the Humber.

The canal has always been kept in an excellent state of repair and, notwithstanding the competition of the railway, there is no danger of its becoming a derelict waterway. In fact, the North Staffordshire Railway may be said to be owned by the Trent and Mersey Canal Company, as the directors of the latter company were the promoters of the railway, and one of the provisions of the Act authorising the construction of the railway was the compulsory purchase of the canal; needless to say, at a figure several times that of its original cost.

The old Harecastle tunnel was opened in 1777; it is 8 ft. 6 in. wide, and has no towing path, boats being propelled through it by the primitive method of "legging," and no less than four hours being occupied by a single journey. The new tunnel was constructed by Telford, and was opened in 1827; it is 14 ft. wide, of which 5 ft. is taken up by a towing path, leaving a waterway of 9 ft. The towing path, however, is constructed upon arches, which allow of considerable further circulation of water during the passage of boats. The boats using the canal have a beam of 7 ft., and their maximun load is 30 tons, when they draw about 3 ft. 9 in. of water. The average headway above water level in the new tunnel is about 9 ft. 6 in., and the depth of water 5 ft. 6 in. The time occupied by a single journey, each boat being hauled by a horse, is about an hour and a half.

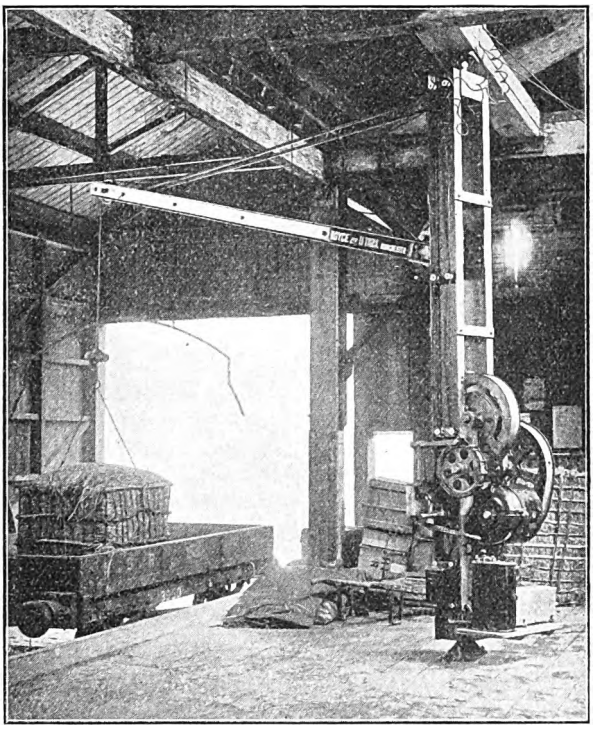
The question of providing an improved method of haulage through the tunnel has been under the consideration of the North Staffordshire Railway directors for a considerable time, and the scheme which they have approved, and which was suggested by Mr. Gordon Thomas, acting in conjunction with Messrs. Bullivant & Co., Ltd., who have had considerable experience in haulage work, and is about to be brought into use, consists in the provision of a fixed steel rope throughout the length of the new tunnel and anchored at some distance outside at each end; upon this rope a tow boat will work, the motors of which derive their power from accumulators

Digitized by Google

contained in a separate boat, and behind will follow a long train of canal barges.

The generating station has been built at Chatterley, on a piece of land between the mouths of the two tunnels, and contains two Campbell suction gas plants, two Campbell 70 b.h.p. gas engines and two General Electric open multipolar shunt wound C.C. dynamos giving 45 kilowatts at 300 volts and 600 r.p.m.

Messrs. Bullivant & Co. are the contractors for the tow boat and the mechanical part of the scheme; the mechanical gear has been supplied by them. The two 15 h.p. electric motors were supplied by Messrs. Royce, and the switchboard, etc., were fixed by the Railway Company. The tow boat is 40 ft. long, 7 ft. wide and 4 ft. deep, with a draught of about 3 ft., and the hull is built of 3-16ths inch steel plate. There is no steering gear, but two wood fenders have been fitted round the vessel to prevent the boat rubbing against the brickwork of the tunnel or towing path.



ROYCE 1½-TON CRANE AT HANLEY.

There are two accumulator barges, each 72 ft. long, and each containing 115 chloride cells in lead lined teak boxes, and one barge will be alongside the generating station, charging up, whilst the other is working through the tunnel. The steel rope is supplied by Messrs. Bullivant & Co., 2 in. in circumference and 3,500 yds. long, being specially constructed for haulage purposes, with a guaranteed breaking strain of not less than 11 tons. The rope passes over two drums in the tow boat. A motor is geared to each of these drums, and they can be operated singly or together as desired.

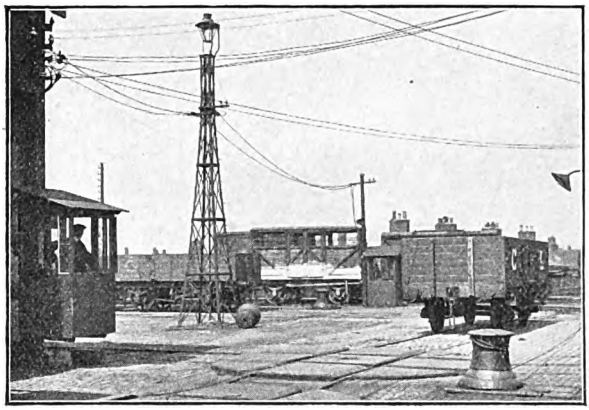
The maximum number of canal boats passing through the tunnel during 24 hours is about 100 in each direction. It is proposed at present to work the haulage plant only 18 hours per day, making about six trips in each direction. The average number of barges to be towed will be about 17, and the speed of working is estimated at between two and three miles per hour. The old canal tunnel will be closed for traffic purposes, but will be used as a by-pass for the circulation of the water displaced by the towage through the new tunnel.

Should the working of the new scheme prove as successful as is anticipated, it is proposed to take out the towing path from the new tunnel, thus providing an unrestricted waterway 14 ft. wide throughout its length.

The North Staffordshire Railway was the first British steam operated railway to have the whole of its passenger stock lighted by electricity. It was the first and, until recently, the only railway on which the electric lighting of trains was under the care of the electrical department, the usual practice on other railways being to place the work in the hands of the carriage department. A commencement was made in 1893, since when all new vehicles have been equipped with electric light, and all previously existing stock has been converted from oil lighting.

Owing to the exigencies of the traffic and the almost continuous use of the rolling stock, the conditions under which the train lighting is maintained are most onerous; nevertheless, the duties are so carefully arranged and performed that it is an almost unknown occurrence for a vehicle to be taken out of running for electrical defects; whilst a whole train has never for that reason had to be "red labelled."

Digitized by Google



ROYCE 1-TON ELECTRIC CAPSTANS AT HANLEY.

The system of lighting adopted is the well-known one of Messrs. J. Stone & Co., but all trains are fitted up in "block," with dynamos and accumulators under the front and rear vans only, one 16 c.p. lamp in each third-class compartment and two 12 c.p. lamps in each first-class compartment of the train being controlled by a switch in the front van, and a similar number of lights in the same compartments being controlled from the rear van. This is a safeguard against a total failure of the light. Three conductors are used in wiring the coaches, *i.e.*, a positive cable from each dynamo and a common negative cable; a method that simplifies the electrical connections at the end of each coach. The electrical couplings between coaches have for many years presented a difficulty, which was in the case of this company overcome by the use of fixed terminals on the ends of the vehicles; flexible connecting cables with suitable eyes being held in position by locking nuts. The repeated occurrence, however, of damage to the panels of the coaches, owing to the shunters' neglect to release the connecting cables before detaching coaches, led to the devising of a most satisfactory coupling, which gives an excellent electrical contact whilst in position and will pull out without damage; the sockets being fixed on the ends of the coaches and the connecting cables being provided with a plug at each end.

Various saloons and other special vehicles used for through traffic to and from other railways are fitted with independent dynamos and accumulators, but with these exceptions all spare vehicles are simply fitted with cables and lamps for connection to the "block" trains.

Speculations and calculations have been made at various times as to the extra amount of tractive power involved on account of the electric light in trains, the result still being in doubt; but it is certain that the introduction of ball bearings on the train lighting dynamos have reduced this considerably, in addition to effecting a great economy in oil and in the cost of maintaining the generators.

In conclusion, it will not be out of place to remark upon the considerable and increasing number of young men who have passed through an apprenticeship in the various departments of electrical engineering on the North Staffordshire Railway, and who are now occupying responsible and remunerative positions as electrical engineers or assistant electrical engineers, chiefly on railways, in all parts of the world; the varied experience they have had the opportunity of acquiring proving an excellent recommendation for such appointments.

Digitized by Google

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

MY first duty in the present article must be that of describing the runs promised in the June issue of the RAILWAY MAGAZINE behind the large new 4–4–0 engines of the Glasgow and South Western Railway—the first type built for that line under the superintendence of Mr. Peter Drummond, late of the Highland Railway. The records were secured on the Paisley and Ayr section of the Glasgow and South Western Railway, where some excellent timings are in force, the most notable of which are the 50-min. non-stop bookings over the 41¼ miles between Glasgow (St. Enoch) and Ayr, by the 5.10 p.m. down and the 8.25 a.m. up expresses. These schedules could not be considered unduly difficult: beyond one or two short and sharp pitches at different points the line is remarkably level, particularly as regards the 15-miles' stretch from Kilwinning to Ayr, and there are no very serious intermediate service slacks, cautious running being only required in the neighbourhood of Glasgow, and through Paisley. Since the introduction of the handsome new trains on the Ayr and Girvan service, the loads have increased somewhat, but could hardly yet be described as exceptionally heavy, as they do not often exceed 200 tons.

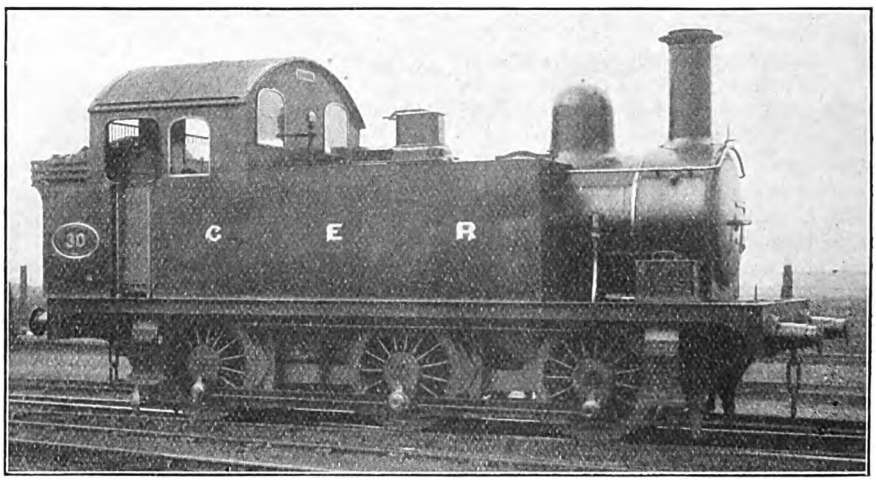
On the outward journey I travelled to Ayr by the 5.10 p.m. *ex*-St. Enoch, behind No. 136 of the new type, the load being a set train of five of the new eight-wheelers, together with a twelve-wheeler and an eight-wheeler for the Turnberry line. The total weight of the train was thus 210 tons, with passengers and luggage; a strong west wind hampered our progress throughout. Quite a good start was made, the 1¾ uphill miles to Shields Road being covered in 3 min. 55 sec., while Gilmour Street, Paisley, 7¾ miles out, was passed in 11 min. 20 sec. Immediately beyond, however, we were brought to a dead stand for signals at King Street box, on account of a train crossing our path ahead at Elderslie. The recovery from this momentary stoppage was disappointingly slow, as the 3¼ miles from Paisley to Johnstone took us 7 min., and the 5½ miles thence to Lochside 7 min. 25 sec., the grades for this distance being a little against the engine. Thus the initial 16½ miles from Glasgow had occupied in all 25¾ min., leaving us 24¼ min. for the remaining 25 miles to Ayr. With the grades favourable as far as Kilwinning, and a practically level track beyond, one might have thought such an achievement possible, but an increased severity in the wind, together with a driving rain, helped to make the running very sluggish. The 6¾ miles from Lochside to Dalry took 7¼ min., the 7 miles thence to Irvine 7 min. 20 sec., and the 8 miles from Irvine to Prestwick 9 min. 5 sec. To the stop at Ayr the last 3¼ miles occupied 4½ min., making our time from Lochside 28 min. 40 sec., and the total time from Glasgow 54 min. 25 sec. Of this loss of 4 min. 25 sec. on schedule, it is impossible to attribute more than 3 min. to the Paisley check, so that nearly 1½ min. must go against the engine.

My return journey was made by the 1.50 p.m. express *ex*-Ayr, on which we were hauled by the same engine—No. 136. This train has an easy run, being allowed 46 min. for the 33¾ miles' run to Paisley, and although the load consisted of seven eight-wheelers and five four-wheelers, its gross weight could not have exceeded 205 tons. The start was not exceptional, 6 min. 20 sec. being taken for the 3¼ miles to Prestwick, the subsequent level stretch of

Digitized by Google

11½ miles from Prestwick to Kilwinning occupying 14¼ min. Near Dalry came a severe permanent way check, so that the 10½ miles from Kilwinning to Lochside took 14¾ min.; from that point forward the 5½ miles to Johnstone were covered in 6¾ min., and the 3¼ miles to Paisley stop in 4 min. 35 sec. So we had exceeded by 40 sec. the 46-min. time allowance, our total time for the 33¾ miles being 46 min. 40 sec., or 44½ min. net. From Paisley to Glasgow, with the intermediate stop at Shields Road, was somewhat disappointing, and in the aggregate from Ayr we had dropped 3½ min., of which 1¼ min. were due to overtime at stations, and the other 2¼ to the Dalry check.

considerably, and an average of 55·6 to 58·4 miles per hour was maintained beyond up to Prestwick. Our time from Lochside to Dalry was 7 min. 35 sec.; from Dalry to Irvine 7¼ min.; and from Irvine to Prestwick 8¾ min.; while the last 3¼ miles to the stop were covered in 3 min. 55 sec. The distance of all but 20 miles from Glengarnock to Newton was covered in the smart time of 21 min. 5 sec., and the journey from Paisley was completed in 41 min. 20 sec. The loss of 20 sec. from Paisley, and 55 sec. from Glasgow, was directly due to the sluggish starts from either place—a disappointing running feature in the case of so powerful a type of locomotive. In the



0-6-0 TANK ENGINE FOR LOCAL GOODS AND SHUNTING SERVICE; GREAT EASTERN RAILWAY.
Designed by Mr. A. J. Hill, Locomotive Superintendent.

Cylinders	16½ in. x 22 in.	Heating Surface, tubes ..	909·4 sq. ft.
Wheels	4 ft.	,, ,, firebox ..	86·77 sq. ft.
Wheelbase	13 ft. 10 in.	,, ,, total ..	996·17 sq. ft.
Steam pressure ..	180 lbs.	Grate area	14·5 sq. ft.
Weight in working order .. 42 tons 9 cwt.			

In comparison with these runs I mention briefly details of two others over the same route, for purposes of comparison. The 12.30 noon *ex*-St. Enoch is allowed only 41 min. for the 33¾ miles from Paisley to Ayr, and we were favoured with the services of a 4–6–0 engine—No. 386—to haul a modest load of 30 axles, or 180 tons. The start was sluggish, as it took us 12 min. 50 sec. to reach Paisley, and we left that town 35 sec. late. Johnstone was passed in 6 min. 25 sec. from the new start, and Lochside in 13 min. 50 sec.—quite mediocre this, too, for 8¾ miles, as the grade is not unduly steep—but then the running smartened up

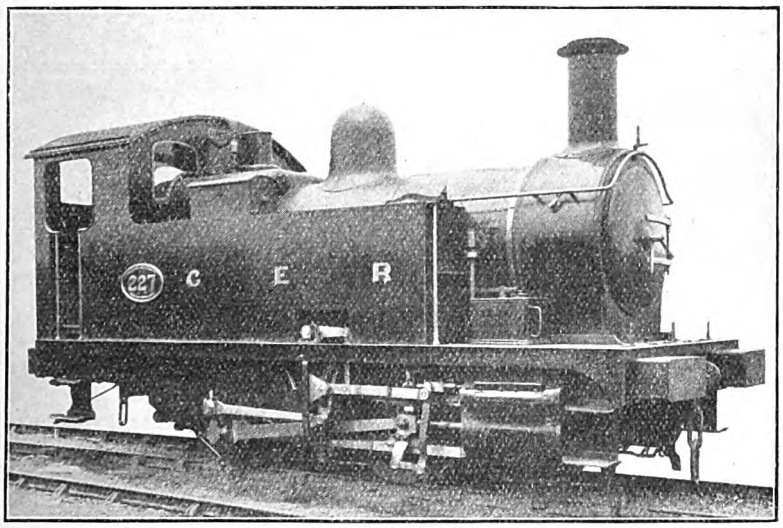
reverse direction we had an early 4–4–0 engine, whose number I omitted to record, with a load of 195 tons; the booking of 49 min. to Paisley in this instance afforded no difficulties, even though the longer and more steeply-graded route was taken from Dalry to Elderslie on the west side of Lochwinnoch. Prestwick was passed in 6¼ min., and we then took 11 min. 5 sec. to Irvine, and 10½ min. on to Dalry. From there the 6¾ min. to Loch Winnoch summit were covered in 9¼ min., and we covered the 5½ miles from that point to Johnstone North in 5¾ min., with a top speed of 62·5 miles per hour at Kilbarchan. The last 3¾ miles

Digitized by Google

into Paisley took us 5½ min., the whole journey of 34¼ miles from Ayr having been completed in 48 min. 20 sec. The remainder of the journey was devoid of interest, but it is worthy of note that this early locomotive was the only one, on all four runs, to keep exact time.

While speaking of new locomotive types, I wish to give some details of the work of two of the superheater express tank locomotive types shown in the recent tables of superheater locomotives, which I feel sure will prove of interest to readers. With the new and graceful 4–4–4 tank locomotives of class D on the North Eastern Railway I have had several runs. When these engines first appeared, their performances seemed only of the most moderate character—barely as good, indeed, as those of the handy 0–4–4 tanks of class O, especially in the matter of acceleration from rest. Now that drivers are more used to them, however, their working becomes increasingly successful, and I believe I am right in stating that their consumption of coal is exceptionally low for the class of work performed. The engines in question, of which 20 are now in service, were built principally to work on the Darlington, Middlesbrough and Saltburn branch, and also for use on the heavily graded Darlington, Kirkby Stephen and Tebay section, but they are now frequently seen on the main line, and also on fast trains between York and Scarborough and elsewhere. The runs about to be described were made on the 7.35 a.m. express from Saltburn to York, and the 8 p.m. express from York to Stockton, which are always now worked by engines of class D. The first-mentioned train covers the 14½ miles from Eaglescliffe to Northallerton, with severe intermediate grades, in 20 min.; the 7¾ miles from Northallerton to Thirsk in 10 min.—a "tight" booking, this, for express engines with large driving wheels; and finally the 22¼ miles from Thirsk to York in 26 min., at an average speed of 51·4 miles per hour. On the return journey the time allowed from York to Thirsk is 27 min., and that from Thirsk to Eaglescliffe—not calling at Northallerton, but slacking severely for the junction—29 min., the latter distance being 22¼ miles. All these bookings, therefore, call for really smart work.

The up journeys from York may be considered first, as from Eaglescliffe southwards.



0-4-0 SHUNTING TANK ENGINE; GREAT EASTERN RAILWAY.
Designed by Mr. A. J. Hill, Locomotive Superintendent.

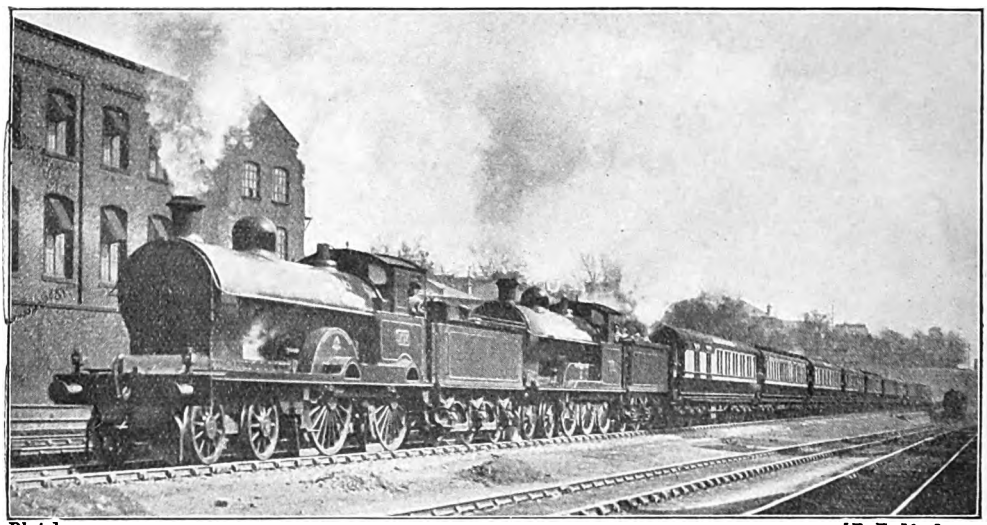
Belpaire firebox. Walschaert valve gear.

Cylinders	17 in. x 20 in.	Heating Surface, tubes ..	905.4 sq. ft.
Wheels	3ft. 10 in.	,, ,, firebox ..	75.1 sq. ft.
Wheelbase	6 ft.	,, ,, total ..	980.5 sq. ft.
Steam pressure ..	180 lbs.	Grate area	13.9 sq. ft.

Weight in working order .. 38 tons 1 cwt.

Digitized by Google

On the first occasion we had No. 2149, with three North Eastern eight-wheelers, and the through Great Northern corridor coach from Saltburn to London, totalling in weight 110 tons with passengers and luggage. On the brief descent to Yarm a speed of 46·9 miles per hour was attained, and a minimum rate of 45 miles per hour was maintained up the 3 miles at 1 in 170 to Picton. Welbury, 8½ miles, was passed in 12 min., and, with very moderate running on the favourable grades beyond, we reached Northallerton in 18 min. 50 sec.—1 min. 10sec. under schedule. From Northallerton a very smart start was made, Otterington, 3½ miles distant, being passed in 5 min. 10 sec., at a speed of 62·5 miles per hour, while Thirsk was reached in 9 min. 50 sec. We started well again from Thirsk, passing Pilmoor, 6¼ miles, in 8 min. 5 sec., and from here until we slacked at Poppleton Junction the speed was maintained without variation at from 61·6 to 64·3 miles per hour. The 12⅞ miles from Pilmoor to Skelton Bridge Box occupied 12½ min.; we passed Poppleton Junction, 20⅝ miles from Thirsk, in 22 min. 5 sec., and stopped at York, after a very slow approach, in 25 min. from Thirsk, the engine having thus gained a minute on this section, or 2 min. 20 sec. in all. My second trip was not so successful. With No. 2145 and the same load, we passed Welbury in 12¼ min. from Eaglescliffe, and reached Northallerton in 18 min. 55 sec., the running being slower uphill, and a little faster downhill. The time from Northallerton to Thirsk was spoiled by a permanent way check, and was 11½ min., or about 10 min. net. After leaving Thirsk we had a slight signal check at Sessay, but the engine did not pick up well, the time to Pilmoor being 9 min., from Pilmoor to Beningbrough 11¼ min. (against 10 min. 10 sec. on the preceding run), and from Beningbrough into York 7 min. 20 sec., owing to a very slow finish. The total time from Thirsk was thus 27 min. 35 sec., or about 26½ min. net, but the total running time showed about ½ min. gain to the engine.



Photo] [*F. E. Mackay.*

LONDON AND NORTH WESTERN RAILWAY.

2 p.m. West Coast express approaching Chalk Farm; 4-4-0 locomotive No. 1737 *Viscount*, and 4-6-0 superheater locomotive No. 979 *W. M. Thackeray*. The leading engines goes off at Willesden Junction, thence taking the "Sunny South Special."

By the kindness of a Saltburn friend I am enabled to give details of two more trips on the same train with D class engines. On the first of these the engine was No. 2151, driven by Darnborough, and the load as usual. The uphill work was a little slow, 12 min. 28 sec. being taken to pass Welbury from Eaglescliffe, but Northallerton was reached in 19 min. From Northallerton the smart start of my first run was repeated, and Thirsk was reached in 9¾ min. Excellent running was made south of Thirsk, the passing time to Pilmoor being 8 min., while Beningbrough, 16¾ miles, was passed in 18 min. 40 sec. A signal check occurred at the engine sheds, where the train was nearly stopped, but an

Digitized by Google

arrival was effected at York in 25½ min. from Thirsk, or 25 min. net. The total gain to the engine on this trip was thus 2¼ min. A finer run was made shortly afterwards with No. 2152, which has certain modifications of the blast arrangement and a longer chimney, and is reputed to be the most satisfactory engine of the series. On this run, with driver Leng in charge, and the same load, Welbury was passed in 12 min. 5 sec. from Eaglescliffe, and, by smart downhill running, Northallerton was reached in 18½ min. From the fresh start Otterington was passed in 5 min. 12 sec., but a severe relaying check beyond caused the Northallerton-Thirsk stretch to take 11 min., but not more than 9½ min. net. A remarkable running exhibition was then given. Pilmoor was passed in 8 min., and speed was maintained at 66 miles per hour thence almost until Alne, where the train was very severely checked by adverse signals. Despite the delay, the 4¾ miles from Pilmoor to Alne were covered in 5 min., and the 5¾ miles thence to Beningbrough, with a wonderfully rapid recovery from the check, in 6 min. The final 5½ miles into York, with another dead slack at the sheds, were covered in 6 min. 35 sec., the gross time from Thirsk being thus 25 min. 35 sec., and the net time certainly not more than 23½ min. On this journey the engine did exceptionally well, gaining 1½ min. on the first stretch, ½ min. on the second, and fully 2½ min. on the third, after allowing for delays—total 4½ min.

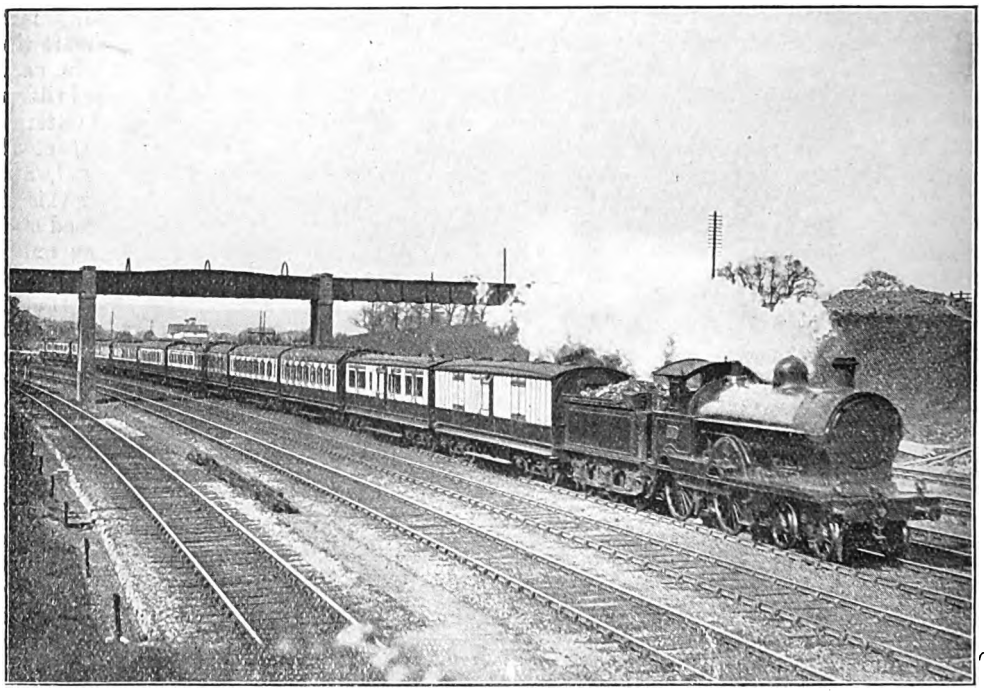
In the reverse direction I also have had an excellent run behind the same engine, on this occasion in charge of driver Hicks. The train was the 8 p.m. *ex*-York, previously referred to, and the load 175 tons to Thirsk, and 140 tons beyond. Beningbrough, 5½ miles from York, was passed in 8 min. 40 sec.; Alne, 11¼ miles, in 14 min. 50 sec.; Pilmoor, 16 miles, in 20 min.; and Thirsk was reached in 26 min. 40 sec.—20 sec. before schedule time. The speed for most of the distance kept at about 56 miles per hour, but increased beyond Sessay to 62·5. With the reduced load the start from Thirsk was remarkably rapid, the speed at the end of 2 min. having reached 42·5 miles per hour, after 3 min. 48·9, and after 4 min. 55 miles per hour, although the grade is slightly against the engine. From Thirsk we passed Otterington, 4¼ miles, in 5¾ min., and Northallerton, at greatly reduced speed, in 9 min. 40 sec.; the 6 miles on to Welbury were climbed in 7¾ min., speed rising finally to 50 miles per hour, and then, with time well in hand, we ran at the most moderate speed from Picton down to Yarm, completing the 22¼ miles from Thirsk to Eaglescliffe in 27 min. 25 sec. The sum of gains on schedule time on this journey amounts to 1 min. 55 sec.

Shortly afterwards I obtained a still finer run on the same train with No. 2145, under the able charge of driver Gibson, and a load of 130 tons. On this trip Beningbrough was passed in 7 min. 55 sec. at a speed of 52·3 miles per hour, while at Alne, passed in 12 min. 25 sec., the speed had risen to 62·5 miles per hour. After this it fluctuated between 57·7 and 60 miles per hour, the passing time to Pilmoor being 18¾ min., while Thirsk was reached in the smart time of 25½ min. for the 22¼ miles, 1½ min. early. The start from Thirsk was not so brilliant, as it took us 6 min. 25 sec. to pass Otterington, and 10½ min. to Northallerton, the junction being negotiated, as usual, at a very cautious rate of speed. After this the ascent to Welbury was tackled in good style, the time from Northallerton being only 7 min. 40 sec., and then the driver did exactly what I was hoping he might, in that he fairly let the engine "go" on the falling grades to Yarm. Despite the comparative smallness of the driving wheels, which have only a diameter of 5 ft. 6 in., the engine ran freely down the 1 in 170 at a high speed which eventually touched 71·4 miles per hour, and we thus completed the 8½ miles from Welbury into Eaglescliffe in 8 min. 55 sec. Our time for the 22¼ miles from Thirsk was thus only 26 min. 5 sec., so that, in all, 3½ min. had been gained by the engine from York. It is thus evident that Mr. Raven's new type is proving in the highest degree successful on all classes of service, and is a notable addition to the express tank types for which this country is justly famous.

Before leaving the North Eastern Railway there is a matter of some interest on which I am encouraged to comment by reason of of a letter received from a Cleveland correspondent. It is the recent deceleration of the famous morning Leeds-Glasgow express of that company, which took effect from the beginning of April last, as from York to Newcastle. Many readers will be aware that colliery subsidences between Ferryhill and Newcastle have been giving the North Eastern Company serious trouble for some time, and to the existing service slacks at Owston Junction (Birtley) and over Durham viaduct—both severe and the latter exceptionally so—have now been added a third

Digitized by Google

just north of Croxdale. These slacks are having a marked effect on the time-keeping, and so much so that the April time tables revealed a number of modified times, increased allowances being given to trains between Darlington and Newcastle, while in certain cases, as that of the 2.5 p.m. *ex*-York (now a 45-min. train to Darlington) this has been balanced by acceleration from York to Darlington. At its inauguration the Leeds-Newcastle "flier" left Leeds at 9.5 a.m., having only 82 min. allowed for the 80½ miles from York to Newcastle, and reached Edinburgh in 4½ hours; on the Birtley slack coming into force, the starting time from Leeds was altered to 9 a.m., and from York to 9.43 a.m., and 2 min. was added from Darlington to Newcastle, but the 43-min. booking to Darlington remained unchanged, giving a total of 84 min. While the original composition of the train held good, the dining car and one or two vestibuled coaches being added at Newcastle, this booking was feasible enough, although even then, in my opinion, considerably harder than that of the so-called "Fastest Train in the British Empire" in the opposite direction. Two years ago, however, it was arranged that the whole vestibuled train, with restaurant car, should start from Leeds, and since then, with a normal load of 30 axles, or about 225 tons full, even the large 4–4–0 R1 type engines which usually work it have found considerable difficulty in keeping time. This difficulty has been aggravated by the enforcement of the further slack at Croxdale, and the regrettable—though presumably necessary—step has been taken of starting the train from Leeds at 8.55 a.m., and York at 9.38 a.m., the 5 min. thus gained being added to the York-Newcastle time. The present time of 89 min. is therefore only 2 min. less than that of the "crack" night expresses.



Photo] [*F. E. Mackay.*

LONDON AND NORTH WESTERN RAILWAY.

Up Liverpool, Manchester and East Lancashire Express; 4-4-0 locomotive No. 2164 *Oberon*.

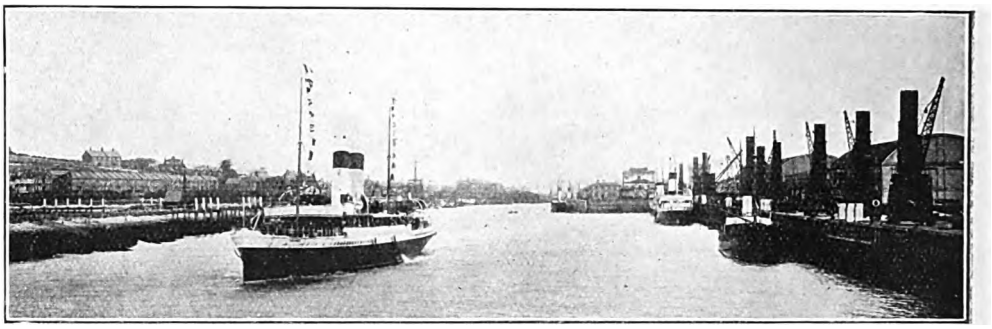
My correspondent wrote to send details of a run which he had on this express two days before the deceleration took effect, the remarkable character of which, as a speed effort, was due to the provision of a pilot from York to Newcastle. The train engine was No. 1245, of the large 4–4–0 R1 class (without superheater) and the pilot No. 2022 of the R class, which has recently received a superheater equipment; the load was one of 280 tons, two extra bogie vehicles being added to the normal load mentioned above.

Digitized by Google

At Beningbrough, 5½ miles from York, the speed had already risen to 65·2 miles per hour, and this point was passed in 7 min. 22 sec. from the start; by the 10½ mile-post the maximum rate of 73·8 miles per hour had been attained. Alne, 11¼ miles, was passed in 12 min. 19 sec.; Thirsk, 22¼ miles, in 21½ min.; Northallerton, 30 miles, in 28 min. exactly. Up to this point the speed had kept steadily at about 72 miles per hour. but on the gently rising grades up to Eryholme it fell to 69·2; Eryholme, 39 miles from York, was passed in 35 min. 42 sec., and Darlington, at a reduced speed of 62 miles per hour, in 40 min. 2 sec., 3 min. having been gained already on the schedule time for this 44¼ miles' distance. The rising grades to Ferryhill, some as steep as 1 in 200, appear to have had little effect, as the 12¾ miles from Darlington to this point were covered in 12 min. 12 sec., giving a total time of 52 min. 14 sec. for the 57 miles from York. Now came the string of checks, those in the first instance at Croxdale and Durham causing the 9 miles from Ferryhill to Durham to take 11 min. 23 sec. Then followed an "extra," in the shape of a permanent way relaying check at Plawsworth, shortly before the usual Birtley slack, the 8¾ miles from Durham to Birtley consuming 9 min. 35 sec., while a further final check at the end of King Edward Bridge—almost a dead stand—was responsible to increasing the time for the last 5¾ miles into Newcastle to 8 min. 22 sec. The gross time for the 80½ miles was thus 81 min. 34 sec., while my correspondent estimates the net time, after allowing for the signal checks at King Edward Bridge, and the permanent way checks at Croxdale and Plawsworth, as 76½ min.

By way of comparison I am giving an experience of mine with the same train and one of the same engines only four days earlier, as showing what extraordinary disparity in running can be recorded under different conditions. The engine was No. 1245, and the load normal—30 axles, or 225 tons. We passed Beningbrough in 8 min. 5 sec., and had just attained the mile-a-minute rate when we were badly checked for permanent way repairs at Tollerton. Thenceforward the running was by no means up to the standard necessary for this train, as we took 14 min. 35 sec. to pass Alne, 20 min. to Pilmoor, 26¼ min. to Thirsk, 34 min. to Northallerton, and 43 min. to Eryholme. On the slightly falling grades to Croft the speed, for some reason that I could not fathom, fell instead of rising, until we had got down to a bare 50 miles per hour; thus it took us 48 min. 40 sec. to pass Darlington instead of the 43 min. scheduled, the engine having already dropped over 3 min. independent of the check. The next thing we experienced was a permanent way check at Bradbury, followed by a worse one at Ferryhill, to which point the 12¾ miles from Darlington took 17½ min. From Ferryhill to Durham the 9 miles took 12¾ min., and from Durham to Newcastle, with still another relaying check at Plawsworth and the usual caution at Birtley, the 14½ miles occupied 19 min. Instead of taking 84 min. for the run, we had therefore made use of a modest 98 min., all but 5 sec.; the net time is beyond my power to estimate, but it certainly would leave a substantial margin against the engine. Incidentally, one might question the wisdom of having no less than *four* permanent way relaying checks in force at once on the same comparatively short stretch of main line, when the hindrances offered by the three permanent checks are already so severe; the time-keeping on the North Eastern main line about that time must, I should think, have left a good deal to be desired.

Digitized by Google



Benn & Cronin, Ltd.] [*London & Brighton.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY TURBINE STEAMER LEAVING NEWHAVEN.

The Continental Services of English Railways.

II.—THE SOUTH COAST ROUTES.

By DENIS O'DONOGHUE.

THE London, Brighton and South Coast Company's service to the Continent *viâ* Newhaven and Dieppe, worked jointly with the French State Railway, forms the shortest route between London and Paris.

The sea passage from Newhaven to Dieppe is 64 miles, covered in 2¾ hours, and the time taken in transit from London to Paris is 8 hours by the day service. Day and night services operate *viâ* Newhaven and Dieppe from London to Paris and *vice versa*. The morning train leaves Victoria at 10.0 a.m. and East Croydon at 10.20 a.m., and the steamer from Newhaven Harbour leaves at 11.30 a.m. The French State Railway runs a corridor train with restaurant car from Dieppe to Paris at 3.15 p.m. by the direct route *viâ* Gisors and Pontoise, due at St. Lazare at 5.59 p.m.; another train leaves Dieppe at 3.26 p.m. running by the old route to Rouen, arriving at Rouen at 4.41 p.m. The work of doubling and improving the direct Dieppe-Paris line *viâ* Pontoise, was completed in time for last summer's working, and the day boat trains between Dieppe and Paris, and the night boat train from Dieppe to Paris, now travel this way. The distance between Dieppe and Paris by this route is shorter by 20 miles than the old route *viâ* Rouen, 104 miles as against 124 miles. Pullman cars are run in the Continental services between Victoria and Newhaven. In connection with the day service from England, wich is first and second class only, through corridor carriages are attached to the boat train from Dieppe for Milan *viâ* Lausanne and the Simplon tunnel, going forward from Paris (Lyon) by the Paris, Lyons and Mediterranean Railway at 10.5 p.m., Lausanne being reached at 7.5 a.m. and Milan at 1.30 p.m. the next day. Tourists for Switzerland, the Tyrol and Italy, will welcome the convenience of this facility. The journey time from London to the Italian tourist centres by the Newhaven-Dieppe day service is approximately 26½ hours to Milan, 33¾ hours to Venice, 36¾ hours to Florence, 31¼ hours to Genoa and 43 hours to Rome. By the night service, first second and third class passengers are carried, the time-table reading as follows:—

Victoria	Dept.	8.45 p.m.
Newhaven Harbour	,,	10.25 p.m. (steamer).
Dieppe (Maritime)	,	3.8 a.m.
Paris (St. Lazare)	Arrive	6.3 a.m.

As in the case of the day service, a second train leaves Dieppe for Rouen at 5.28 a.m., due there at 7.14 a.m. The night boat train from Dieppe to Paris is formed with corridor

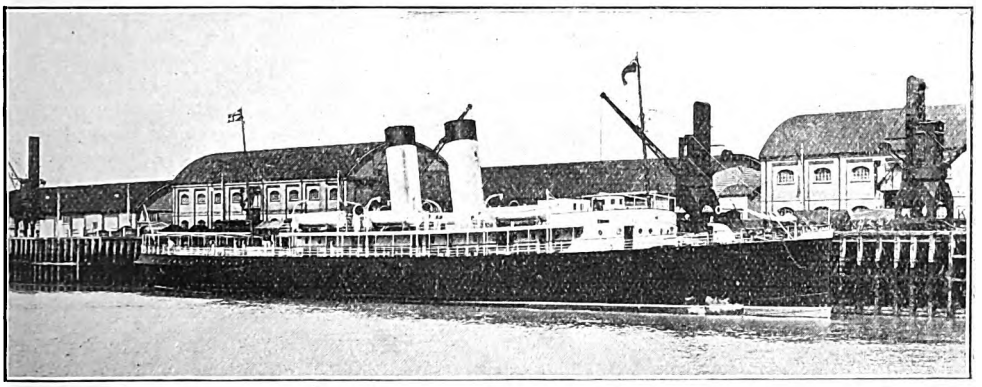
Digitized by Google

carriages for first, second and third class passengers. and sleeping compartments are available for first class ticket holders.

The service from Paris to London balances the arrangements from London, except that the night boat from Dieppe is served by one train only from Paris, which follows the old route *viâ* Rouen and not by two trains. For the day service trains leave Paris at 10.0 a.m. *viâ* Pontoise, and Rouen at 11.12 a.m. to connect with the steamer sailing from Dieppe, due at Newhaven Harbour at 4.45 p.m., passengers for London arriving at Victoria at 6.10 p.m. The night train leaves Paris at 9.20 p.m., the boat is due at Newhaven at 6.0 a.m., and London reached at 7.30 a.m.

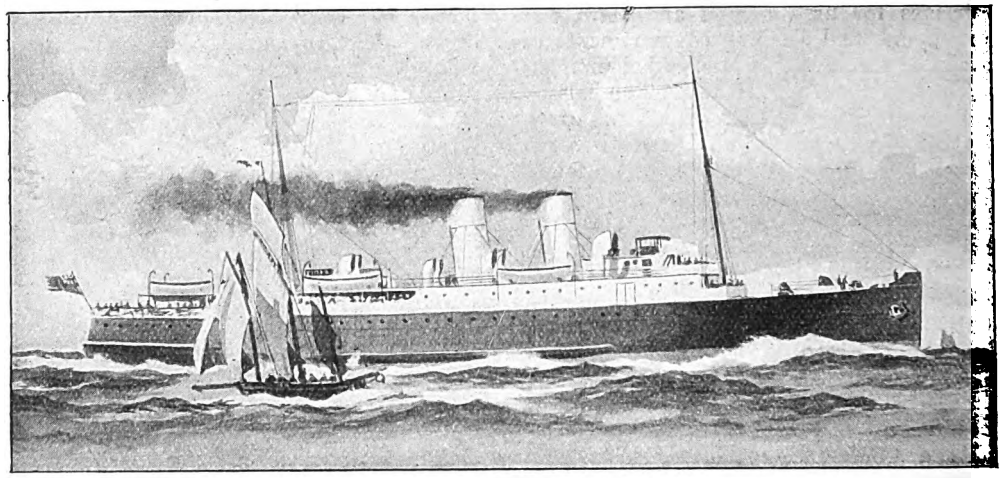
At a Conference recently held in Paris between representatives of the Brighton Railway Company and officials of the State Railways of France, many improvements and accelerations in the services between London and Paris, *viâ* Newhaven and Dieppe, were arranged to come into operation next year. The morning services from London and Paris will be accelerated by about half an hour in each direction and an afternoon service between London and Paris will be run during the summer months. The State Railways have ordered for these services another fast turbine steamer, to be named the S.S. *Versailles*, from the Forges et Chantiers de la Mediterrannée.

The Brighton Company claim for the Newhaven-Dieppe route to the Continent that it is the shortest and most picturesque route, and it certainly is, without question, an exceedingly pretty route. Opinions will vary, no doubt, concerning the respective merits of the scenery of the counties of Surrey and Sussex on the one hand, and of Kent on the other, but the relatively drab and uninteresting country traversed by the Northern of France Railway can hardly be compared with the delightful Normandy scenery and the views along the Valley of the Seine, which can be seen *en route* from Dieppe to Paris. The Dieppe service brings the Britisher into communication with the holiday resorts of Western France, some fashionable and gay, others quiet and modest. Dieppe is a first class sea-side resort, offering the visitor the best of bathing and amusements, including a first class casino and golf links. Puys, where the late Lord Salisbury was a constant visitor, is a couple of miles to the east of Dieppe, and about 4 miles beyond is Berneval, a little village frequented by artists attracted by the charm of its situation. Environs of Dieppe to the west are Pourville, Varengeville, Sainte-Marguerite and Quiberville, all pleasant holiday places with scenery ranking among the finest in this part of Normandy. Further west, Veules-les-Roses, Fécamp and Etretat, each with a casino and supplying a variety of first rate amusements and distractions for holiday makers. Veules-les-Roses, as its name implies, is famed for its wonderful show of roses. Fécamp, apart from being a gay sea-side town, is noted as the home of Benedictine liqueur, and the great distillery, built in the renaissance style, of most imposing proportions embellished with wonderful examples of sculpture and painting, and with its famous museum, attracts visitors from all parts of the world.



LONDON, BRIGHTON AND SOUTH COAST RAILWAY TURBINE STEAMER *Newhaven* IN NEWHAVEN HARBOUR.

Digitized by Google



LONDON AND SOUTH WESTERN RAILWAY TURBINE STEAMER *Normannia.*

Etretat is not a large town in point of population, but it provides many attractions of the first class, golf of course included. It is an exceedingly popular place with English visitors, and accommodation in the season is eagerly sought for. Midway between Dieppe and Etretat is Saint Valery-en-Caux, a rapidly rising resort drawing many English visitors, who do not care for fashionable crowds and the organised amusements which follow them, but who are content with the casino, the "plage" and the interests of the little harbour. Other small places on the sea reached *viâ* Dieppe are St. Aubin and Sotteville, St. Pierre-en-Port, Yport and Senneville.

A good train service connects Etretat, Fécamp and St. Valery-en-Caux with Dieppe; road conveyances are necessary to complete the journey to the other places mentioned.

Inland from Dieppe is a wealth of delightful country scenery, orchards and farm houses, rivers studded with islands and fields dotted with tall poplars, the land of Corot and Danbigmy. The Brighton Company have arranged in co-operation with the French railways, circular tours covering the holiday centres of Brittany and the historic Loire Valley with its castles and cathedrals, in addition to tours in Switzerland, Germany, Austria, the Pyrenees, Spain, Italy, Sicily and Algeria and Tunis *viâ* Marseilles.

The sailings between Newhaven and Dieppe, were inaugurated in 1867 and the fleet of steamers is owned jointly by the Brighton Railway and the French State Railway. Seven steamers, all equipped with wireless telegraphy and five with turbine engines, are allotted to the passenger traffic. Two of the new boats were designed to replace the older type of French vessel and are triple-screw boats of 1,600 tons and 9,000 horse power, with a speed of 24 knots an hour. The latest addition to the fleet, the S.S. *Paris* launched last summer, was built to the order of the Brighton Company, and is the largest boat in the service, with a tonnage of 1,773, horse power 12,000 and speed of over 25 knots an hour. The turbine engines of this ship are geared, and it embodies in every respect the newest ideas in marine engineering and design. A separate fleet of six twin-screw steamers of from 560 to 1,525 tons is employed in carrying merchandise between Dieppe and Newhaven, a flourishing goods trade existing between these ports, the imports at Newhaven for a year totalling 49,000 tons and the exports 33,000 tons.

What the Brighton Company does to provide the means of easy access to Normandy, the London and South Western Railway does to supply direct and comfortable transport between England and Brittany and Normandy, by steamers sailing from Southampton to Havre and Cherbourg for Normandy and to St. Malo for Brittany. The London and South Western Railway is old in the experience of steamship working, the Southampton-Havre service being inaugurated as long ago as 1847,

Digitized by Google

and, as the list of the Continental sailings given below will show, the steamboat department is responsible for a big undertaking :—

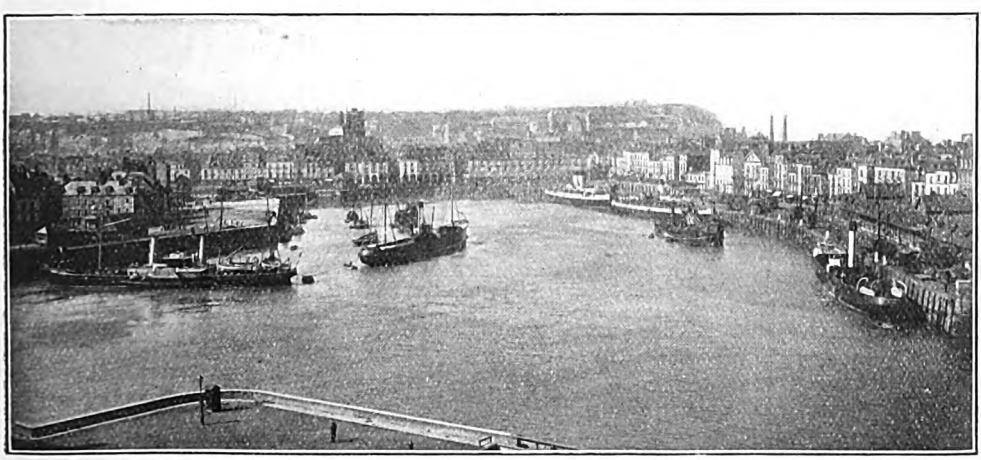
Southampton–Havre. Sailings daily, 104 nautical miles.
Southampton–Cherbourg. Sailings thrice weekly,* 83 nautical miles.
Southampton–St. Malo. Sailings daily, * 151 nautical miles.
Jersey–St. Malo. Sailings thrice weekly, * 33 nautical miles.
Jersey–Granville. Sailings thrice weekly, * 30 nautical miles.
Southampton-Honfleur. Merchandise only.
Southampton – Roscoff. Merchandise only.
Southampton–Tréguier. Merchandise only.
* Summer sailings. Reduced for winter months.

The principal service, which links one of the three great ocean ports of Britain with the chief ocean port of France, is the Southampton-Havre service, which gives a connection to Paris by the French State Railway *viâ* Rouen and Mantes. The channel crossing is made in 6½ hours (open sea passage 5 hours) and the leisurely traveller who fears not the sea will not be likely to overlook the luxury of getting a good night's rest while travelling possible by this route. Travellers to Paris and the Continent by the Southampton-Havre route from the commercial towns of the Midlands and the North and from South Wales, will find that the convenient train service direct to Southampton enables them to make a continuous journey without losing a night's rest and arriving at their destination jaded.

The service has lately been improved and accelerated, and to keep with the times two new steamers the S.S. *Hantonia* and S.S. *Normannia*, fitted with geared turbine engines and " cruiser " sterns giving greater steadiness in heavy seas, and with accommodation specially designed for the night passage, have been constructed and put on the service. These vessels are equipped with the Marconi system of wireless telegraphy and are lighted by electricity, while special attention has been paid to the ventilation, which is on the thermotank principle.

The boat train from London to Southampton with restaurant car leaves Waterloo at 9.45 p.m. (10.30 p.m. from July 1st) each week day and the steamer sails at 12.30 midnight, arriving at Havre at 7.0 a.m. A train leaves Havre at 8.6 a.m. arriving at Rouen at 9.17 a.m. and Paris at 11.24 a.m. During the height of the summer season an extra service is given to Havre on Saturdays, by a day boat leaving Southampton at 11.15 a.m., the train in connection leaving London at 9.30 a.m., commencing July 25th. From France the service is similar except that in order to balance the working the extra boat from the end of July to the middle of September sails on Sunday nights, instead of in the day time on Saturdays, thus providing for a service by night every day during the busy holiday time.

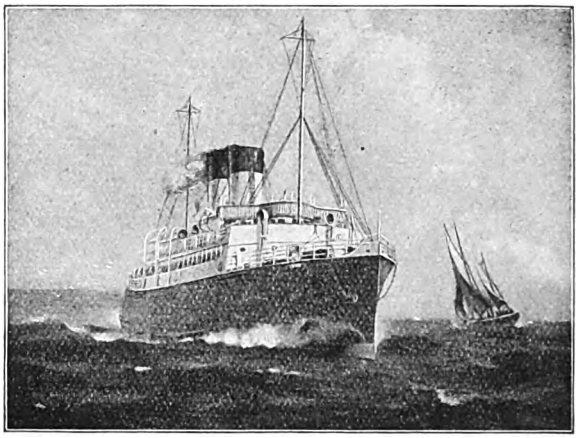
The St. Malo sailings, which are of the first importance from the passenger point of view, and which carry the greater number of the holiday visitors to Brittany, work to a tide-table, a daily service being



Benn & Cronin, Ltd.] [*London and Brighton.*

DIEPPE HARBOUR.

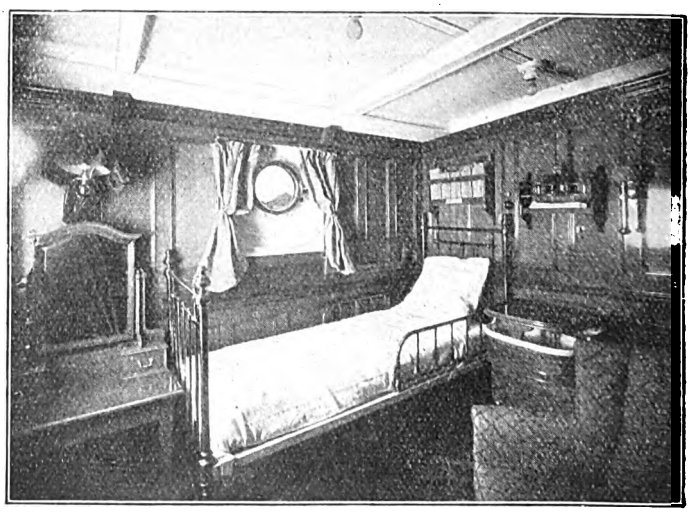
Digitized by Google



LONDON, BRIGHTON AND SOUTH COAST RAILWAY TURBINE STEAMER *Paris*.

maintained both ways during the season. Brittany forms a great holiday ground for the fashionably inclined, as also for those who have to spread a very little money over a holiday vacation of a month or more, and who find that the small sum available goes a long way in the land of the Bretons, a race of hardy agriculturists and fisher folk whose simple faith Pasteur, the eminent French scientist, sighed for. The exhilarating air, good fare, and excellent sport, combined with low prices and lovely scenery, added to the attractions of a land of history, tradition and legend, draw increasing throngs each year from industrial and commercial England to Brittany.

St. Malo, Paramé and Dinard, are resorts well known to British visitors, and attract increasing numbers each year to enjoy gay holidays in these charming sea-side resorts, whose programmes of fêtes and regattas, yachting and fishing, golf and tennis, concerts, theatricals and balls provide an unbroken round of enjoyment. There could be no better place for the English tourist to make acquaintance with a French sea-side resort than St. Malo, Paramé or Dinard. The animation and the light-hearted gaiety, the merry children digging in the golden sand, the jolly bathers splashing in the waves, and the universal holiday "atmosphere" captivate the visitor's fancy immediately. St. Malo presents a very animated appearance by night. The cafés outvie each other in providing entertainments and the municipal Casino attracts a numerous company. Paramé, practically a suburb of St. Malo, is a magnificently situated resort with fine boulevards and terraces, and a matchless beach with fine golden sands giving luxurious bathing. It is one of the gayest resorts in the north of France and has become exceedingly popular with English people. It owns a palatial casino facing the beach in which entertainments of great variety are given. Dinard, which is reached by motor boat from St. Malo in about ten minutes, like Paramé, is a pleasure providing place full of gaiety, smartness, and fashionable frocks, with golf, tennis, regattas, bands, etc., to amuse. It is impossible to be dull in these health giving holiday places on the Brittany coast. On the borders of Brittany and Normandy is the historical monument of Mont St. Michel, easily reached from St. Malo, Dinan and Dinard. In area the island is about half-a-mile by a quarter-of-a-mile, and its inhabitants number about 230. The lofty walls, turrets and buttresses of the monastic buildings tower above the houses, while crowning the whole are the pinnacles,



"CABIN DE LUXE" AS FITTED IN THE NEW LONDON AND SOUTH WESTERN RAILWAY TURBINE STEAMERS.

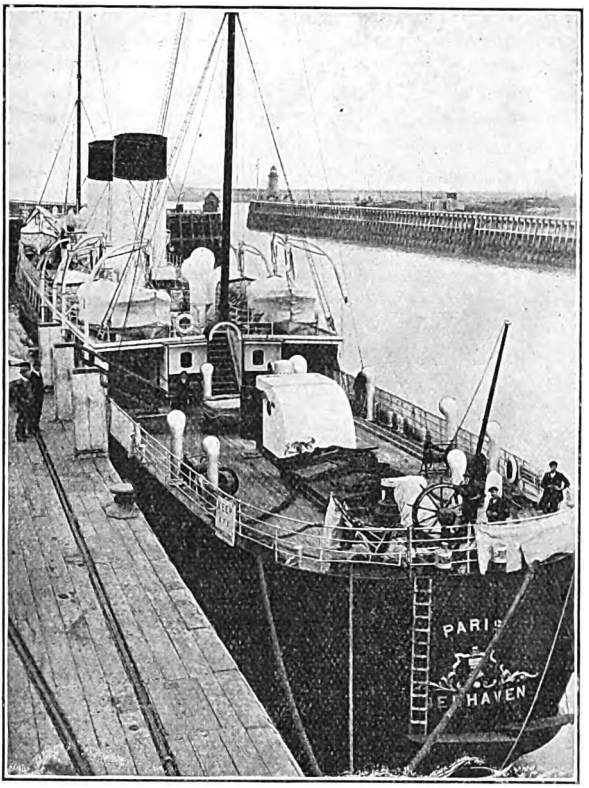
Digitized by Google

tower and spire of the church at its apex 400 ft. in height. The construction of this stupendous pile of superb beauty is as difficult to account for as the building of the Pyramids, but according to legend it was founded by St. Aubert, Bishop of Avranches, early in the 8th century, at the command of St. Michel.

From St. Malo many holiday resorts are reached other than fashionable Dinard and Paramé. Across the water, connected with St. Malo by the rolling bridge or "spider" as it is familiarly called, is St. Servan, a fine town with an English colony. From the Fort de la Cité at St. Servan is obtained one of the finest panoramas on the whole French coast. Dinan, an inland town on the River Rance draws many visitors, and the trip up the river from St. Malo to Dinan is one of fascinating beauty. Among the smaller of the many Brittany holiday resorts may be mentioned Rotheneuf, situated between the Bay of the Val and that of Lupin; Cancale, considered the most picturesque of all the fishing villages along the coast; St. Enogat with its Fairy Grotto, superb rocks and magnificent views; St. Briac, which has become one of the most seductive of Breton resorts; St. Lunaire, close to St. Briac, with two beaches of fine sand; and St. Cast, high up overlooking the Baie de la Fresnay, adjacent to Dinard.

St. Malo admirably fulfils the functions of the port for Brittany holiday resorts, and the following table will show how accessible the various resorts are for British visitors travelling by the London and South Western Railway service to St. Malo.

Dinard ..	Adjacent to St. Malo. 12 hours from London.
Paramé ..	
St. Servan ..	
Dinan ..	2 hours rail from St. Malo; or by steamer down River Rance.
Rotheneuf ..	2 miles from Paramé.
Cancale ..	Tram from St. Malo.
St. Enogat ..	Ferry from St. Malo to Dinard and thence by steam tram.
St. Cast ..	Ferry St. Malo to Dinard and on by rail to Plancoet; thence by steam tram.
St. Briac ..	Ferry St. Malo to Dinard, thence steam tram.
St. Lunaire ..	



Photo] *[Topical.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY TURBINE STEAMER *Paris.*

The sea passage from Southampton to St. Malo is 151 miles and for last summer's working the London and South Western Company put on the service the S.S. *Sarnia* a turbine boat equipped with wireless telegraphy, of 1,498 tons and 6,350 indicated horse power, with a speed of 20 knots an hour. The S.S. *Princess Ena* and S.S. *Vera* are both allotted to the St. Malo sailings. These are twin-screw boats of 1,198 tons and 1,178 tons and 16 knots and 19½ knots per hour respectively. The steamer sailings from Jersey to St. Malo (33 miles) and Granville (30 miles) are governed by the tides, and during the holiday season three trips a week in each direction are made on both services, the sailings being by the steamers *Laura* and *Victoria*. There remains now to mention the passenger service to the Continent *viâ* Cherbourg. The third naval port and arsenal of France, Cherbourg is a comfortable town possessing a casino and good hotels. The Southampton-Cherbourg service is the most direct for western

Digitized by Google

Normandy, and is popular with tourists and sketching parties who make rambling holidays on foot or awheel in the peninsula forming part of the Department of Manche. Like the Havre route the crossing is by night, the open sea passage occupying 5 hours. London passengers leave Waterloo at 8.15 p.m. for the steamer sailing from Southampton at 11.15 p.m. The service only operating three times a week each way (twice weekly during the winter) is a drawback to the route so far as visitors from England to France and *vice versa* making short stays from home are concerned, and for this reason it is unlikely that the London and South Western Company will need to provide for a rapidly expanding traffic on this service. The idea seems to be to concentrate attention on the Havre route. This arrangement of course is the considered policy of the Company, and it is obviously the right one, the position of Havre being much more convenient for Paris and the south of France than Cherbourg, which is twice as far from Paris.

As might be expected a large trade is done in butter and vegetables from Cherbourg to Southampton, and for merchandise alone two sailings are made from Cherbourg each week outside the passenger sailings. Altogether the London and South Western Company have eight steamers employed in cargo traffic between French ports and Southampton, services being maintained exclusively for merchandise between Southampton and Roscoff and Southampton and Honfleur. Butter, fruit and vegetables form the principal imports, although a quantity of French manufactured articles come over by the Havre boat.

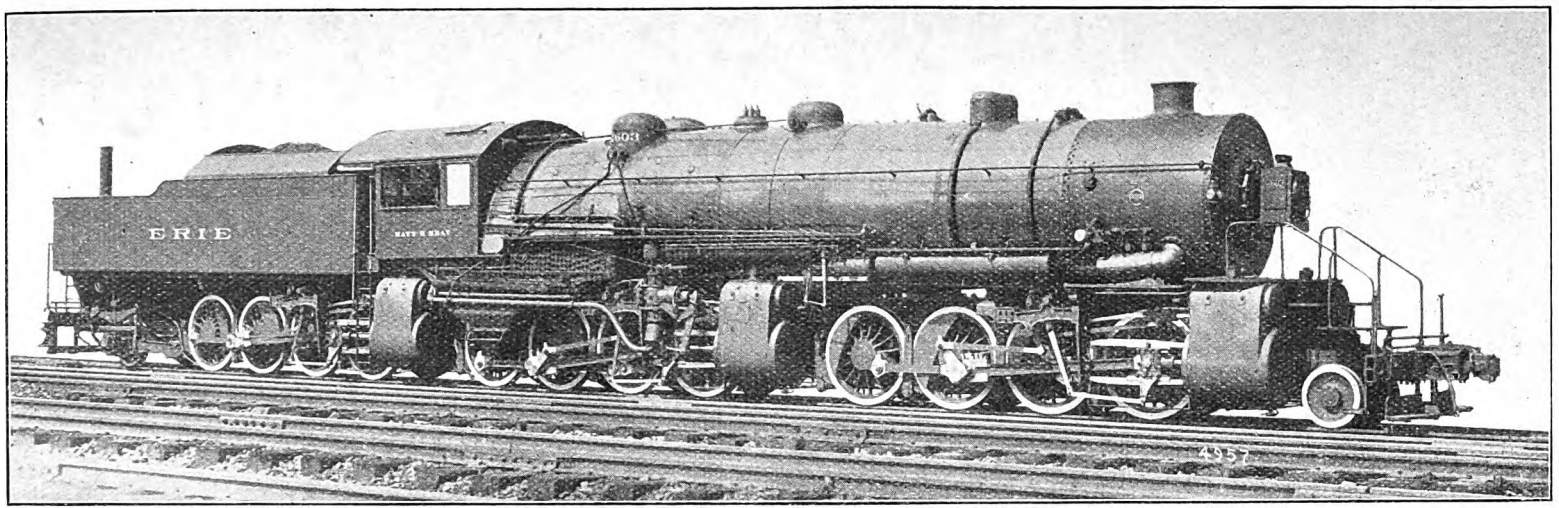
The improvement of the South Coast services to France lately effected will help to accelerate the rate of increase of the rapidly growing number of people who annually leave home for a sojourn abroad, and the London, Brighton and South Coast and London and South Western Companies may safely look to the future of their Continental traffic with optimism : rivals to some extent, there is ample room for the expansion of the Continental services of both.

LE HAVRE.

Digitized by Google

2-8-8-8-2 "TRIPLEX" ARTICULATED LOCOMOTIVE: ERIE RAILROAD.

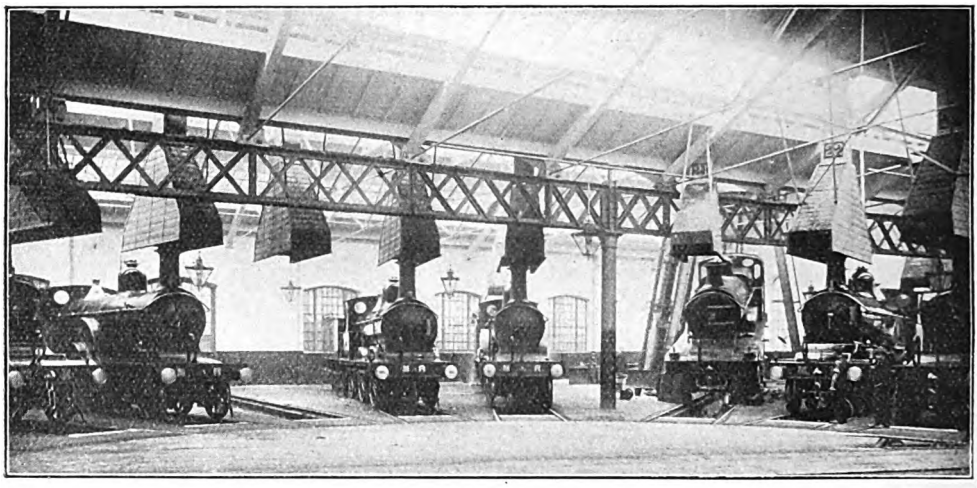
BUILT BY THE BALDWIN LOCOMOTIVE WORKS.



The Baldwin Locomotive Works have recently completed, for the Erie Railroad an engine for pusher service which is by far the most powerful locomotive yet built. This engine has been constructed under patents granted to Mr. George R. Henderson, consulting engineer of the Baldwin Locomotive Works. The wheel arrangement is 2–8–8–8–2, the third group of driving wheels and the rear truck being placed under the tender section. The cylinders are all of the same size, two acting as high pressure, and four as low pressure. The two high pressure cylinders drive the middle group of wheels. The right-hand high-pressure cylinder exhausts into the two front cylinders, and the left-hand high-pressure cylinder exhausts into the two rear cylinders.

Leading dimensions are: Cylinders, 36 in. by 32 in.; coupled wheels, 5 ft. 3 in.; rigid wheelbase (each set)—16 ft. 6 in., total, 71 ft. 6 in.; steam pressure, 210 lb.; heating surface—firebox 272 sq. ft., combustion chamber, 108 sq. ft., tubes, 6,418 sq. ft., firebrick tubes, 88 sq. ft., Schmidt superheater, 1,584 sq. ft., total, 8,470 sq. ft.; grate area, 90 sq. ft.; adhesive weight, 331½ tons; total weight in working order (necessarily including tender), 367½ tons.

Digitized by Google



IN THE RUNNING SHEDS AT KENTISH TOWN.

Leaves from the Log of a Locomotive Engineer [No. XXII.].

By ROBERT WEATHERBURN.

SOME years ago a case occurred on the Tottenham and Hampstead Branch, worked jointly by the Great Eastern and Midland Railways, which one would hardly consider possible. A Great Eastern driver had occasion in the early morning to run a light engine from Junction Road to Highgate Road, in order to cross over to the down line. After his arrival at the latter station, and in full, but mistaken, belief that he had effected such crossing, he reversed his engine, and started on his return journey on the same (up) road. The first intimation of his mistake was coming into violent collision with a Midland Railway early workman's train near Harringay, and the result would have been disastrous had not the driver of the workman's train seen the unwonted spectacle of a light engine careering towards him on the wrong road.

As it was, the damage to stock was heavy, and several passengers, as well as the men on the Midland tank engine, were more or less hurt. The violence of the shock was so great as to require the use of a third engine to drag them apart, and even then some of the broken and bent portions were so tenaciously interwoven as to necessitate them being cut before separation was effected.

Of course the investigators into this occurrence as well as those described before, could come but to one foregone conclusion. Yet there are cases so intricate where the evidence for and against is so balanced as to make decision a question of difficulty.

A Scotch express, under admirable conditions for the effective application of the brakes, ran into the stop blocks at St. Pancras one Sunday morning. The shock was so severe that several carriages were telescoped, and the buffer stops smashed. On my arrival I mounted the engine for the purpose of testing the brake. The driver, who was standing by, remarked "The brakes are all right, sir, there is no fault with the brakes."

This I verified by raising the proper amount of vacuum. I instance this particularly, as one of the principal newspapers qualified the announcement of the accident by "Failure of Brakes." After clearing the line, I asked an explanation of the driver and fireman, who both solemnly averred that the train was run in at the usual speed. This was confirmed by the two guards and the platform inspector, the

Digitized by Google

latter, a man of long experience. The pointsman in the box at the time, and other witnesses bore similar testimony.

The train was of the usual make up, both as regards vehicles and loading. Here we had the evidence of a sober and experienced driver and fireman, daily in the habit of running into the station, thoroughly familiar with the working of the brake, which was in perfect condition, as he repeatedly averred. The speed no greater than ordinary, as borne out by the evidence of guards, platform inspector, signal box man, and others, all reputable witnesses. On the other hand, the once massive buffer stops smashed to splinters, carriages telescoped, engine partly mounted on platform, all bore striking testimony to a speed far in excess of seven to eight miles per hour.

Fortunately in one sense, the onus and responsibility of a decision as to cause and blame is removed from the Company's officials to the official appointed by the Board of Trade to investigate, and report on accidents. In this instance it was the late Major Marindin, the "Bayard" of Government Inspectors, whose name and reputation through a long and arduous career were honoured by all who had the privilege of knowing him. His decision, after lengthy consideration, was that the speed of entrywas in excess of that stipulated. The punishment was almost nominal, namely, transference from main line to branch passenger work for a period. I may here remark that, in view of the difficulty of estimating low speeds, the rule is to approach the terminal stations, and others classed as such, at no greater speed than that controllable by hand brakes.

One, if not the chief, study underlying every phase of duty should be the accomplishment of the greatest mileage with the least loss of life or injury. This can only be obtained by exacting from those responsible the most careful examination of such parts of machinery which are likely to suffer or depreciate, either by prolonged use, or sudden strain, such as tyres, axles, all moving parts, boilers and other constituent parts. Any dereliction or neglect of duty on the part of those appointed to examine, or not promptly reporting or bringing under notice, any abnormal or defective condition, to be punishable. This may appear arbitrary, but it is nevertheless necessary and just, in order to inspire the drivers with that confidence which is begotten of perfect reliance on the supervising power. One instance will show the importance of this.

Examining fitters are appointed to periodically take down those portions of machinery more than ordinarily liable to fracture, and subject them to the closest scrutiny for flaws or incipient fractures. It occurred to me that such men (fitter examiners) were liable to defective eyesight, although provided with a magnifying glass. Accordingly, each was put under the eye test, and to my surprise and dismay, one, a most amiable and popular workman, was found to be half blind, and had been, and was, relying on the untrained eyesight of his unskilled labourer to fulfil such duties. In view of the onerous and responsible character of the work, there was no other alternative but removing him. This action was considered arbitrary and unjust by some, but such action was necessary for the interest and safety of the drivers, firemen, and public. Ever after, the qualifications for an examiner included eyesight test, in addition to a knowledge of parts. This caused a certain amount of resentment, thus showing how any extra precaution on behalf of one class, provokes irritation in the other.

The custom or habit of doing things in certain ways renders men amazingly obstinate and indifferent to their own safety. Accidents due to defective slings and chains for lifting engines were not infrequent at railway depôts. The fact that every link included a weld, and that an unknown quantity, rarely if ever entered into their minds. In the year 1878, I determined to obviate this as much as possible by substituting lifting bars and slings in which no cross strain or uneven tension would be possible, all strains to be tensile, and so designed that they could not be unmechanically applied and with such a factor of safety as to preclude the possibility of accident. This action was looked on askance for a time, and indeed it took twenty years before it became generally adopted. Again, in order to provide the greatest degree of safety, bad or scamped workmanship was treated as a punishable offence. Every foreman, or responsible man, was drilled into the idea that no engine should be considered fit for duty, unless, like Cæsar's wife, it was above suspicion. Such and many others are the duties that the officials owe to the men. But in order to avoid misapprehension, some explanation is at times required.

Digitized by Google

Digitized by Google

1887 will always be a memorable year in the annals of the Midland Railway, on account of the drivers and fireman's strike, which although of short duration, was fated to have far reaching results. It has already been understood that the conditions of service of this particular branch of railwaymen would at that time bear more than a favourable comparison with that of any of the other companies; hence it was a subject of surprise to railway men generally that the Midland should be selected as the arena for such a conflict.

The majority of the enginemen and firemen had been for years represented by two rival societies; "The Old Enginemen's Society," having its headquarters at Birmingham and enjoying the most friendly terms with the Company, its aims and policy being purely that of a Benefit Society; and the Leeds "Society of Enginemen and Firemen," composed of more ardent spirits, and constituted more on the lines of Trade Unions, favouring a more active and militant policy, so that it appealed to the younger and more restless men. Between the two there was little neutral ground.

On the other hand there was the Amalgamated Society of Railway Servants, numerically a more powerful body, not exclusive, admitting all conditions of railway men, as the title implied, without distinction, disseminating their views and proslytising by means of their special paper the *Railway Review*. This society had hitherto made progress amongst the general mass, but experienced difficulty in recruiting from the more skilful and better trained and paid men of the footplate, who were naturally averse to being put on a level with their less-skilled fellows.

The position was somewhat of a triangular one. The Birmingham Society, decidedly non-aggressive, largely composed of the older and sager men. The Leeds Society, aggressive and ambitious to push themselves into notoriety. Both exclusively recruiting from the footplate and equally averse to joining with the the rank-and-file of the A.S.R.S.

The journal of the Amalgamated Society however, affording as it did the means of formulating charges and ventilating grievances, appealed so strongly to the younger and more dissatisfied men that in course of time it not only influenced the men of the Leeds Society, but also obtained a footing amongst those who in the course of graduating upwards would otherwise have become exclusives. These were again strengthened by a number of the senior hands who were far from being at one with the pacific policy of the Birmingham Society. After a time the A.S.R.S., strengthened by the success of its policy, and feeling secure of the services of some of the most adventurous and influential of the exclusives, was anxious for a forward movement. After a few years of active propagandism the time was considered expedient to formulate certain demands on the Midland Railway Company. These petitions were made in such a manner that the semi-courteous tone hardly veiled the implied threats, if they were not conceded.

This action, although not unexpected, precipitated matters considerably and raised a ferment amongst the neutrally disposed, and the more pacifically inclined members of the Birmingham Society, many of whom had already recognised the twofold policy of the A.S.R.S. of, if possible, killing two birds with one stone, *i.e.*, defeating the Company, and at the same time advertising the weakness of the exclusives, and thus forcing amalgamation or otherwise discrediting their rivals to the utmost.

Strong measures were openly advocated, and so glowingly optimistic were some of their speakers that in many cases the wavering were induced to membership or obedience. Delegates were selected and empowered to meet, and treat, with the Company's officials or Directors. Special meetings were almost nightly held at the various Club Houses, recalcitrants were made to understand, by hints and innuendos, what their condition and treatment would be after the victory, until even those most popular with their fellows, who favoured a moderate policy, were afraid of speaking as openly as they desired.

The extensive ramifications of the Society enabled them to influence more or less the men of other railways, particularly those running in connection or junctioned with the Midland. Having thus prepared and strengthened their position, a system of intelligence signals by means of the engine whistle when approaching and passing each other was devised. The climax of their efforts, however, was reserved for the night of the strike, when it was arranged for each train to stop at 12 o'clock and pull the fire out, thus completely stopping the traffic.

The one amazing feature was the apparent attitude of indifference exhibited by the

Digitized by Google

executives of the other main line railways; certainly not to be wondered at, when the majority of our own directors believed that the crisis would pass by harmlessly. For my own part I never doubted from the first but that a strike would occur; and personally pushed that view strenuously to the fore, and in order to meet such a contingency had devised a policy of my own which I soon had the satisfaction of seeing accepted.

Some time before the strike occurred, I met Mr. Johnson and several of the members of the Locomotive Committee of directors by appointment at St. Pancras. Mr. Cropper, the then Chairman of the Committee, asked me whether I really thought there was going to be a strike. I unhesitatingly answered "Yes" and advised strenuous measures, and he, as emphatically, insisted that I was wrong, and informed me that they had engaged to meet the delegates that night at Derby. Now I knew from the first that the Midland Railway Company had been selected for the hostile movement, not on account of worse status than others, but with the idea that the subjugation of such a company, well known for its liberal views and treatment of its men, would be the sure forerunner of success with all others.

Impressed with this I ventured to suggest the inadvisability of such meetings as serving to prolong the inevitable and strengthening the men who were longing to come to grips with the belief that the Company was wavering. Yet this view seemed of no avail with Mr. Cropper, but had its weight with Mr. Johnson and others. In pressing my views still further, I was asked what course I would recommend if the worst came to the worst. I then suggested that every other railway running into London should be asked to assist, either by direct help, or by supplying us with a list of all likely and capable enginemen who had either left their employ or been discharged for minor offences. I knew from applications frequently made to me that there were many who had left railway service, and found out afterwards that they had made a mistake and would willingly return. I recommended that the address of all such should be at once obtained, and the men personally canvassed and, if agreeable and able to pass our examination, be engaged forthwith. I had anticipated the action I recommended and had already such a list well in hand and local support promised. After a short consultation apart, Mr. Johnson informed me that I had a free hand to recruit at once, and make use of his name wherever needed.

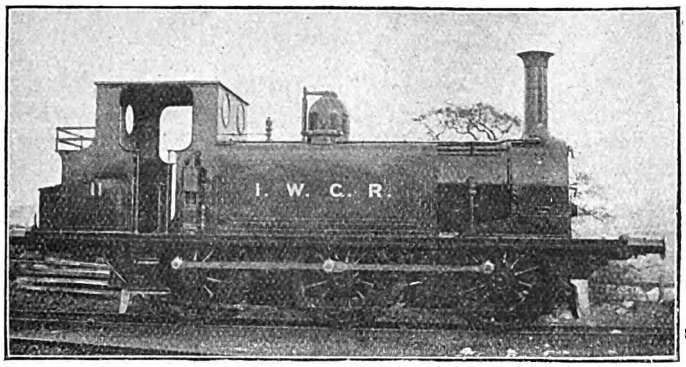
An hour afterwards I had wired and made appointments with the London representatives of the London, Brighton and South Coast Railway, and the London, Chatham and Dover and other southern railways, and obtained from them a list of men who were likely to suit. I knew full well the footplate hunger that besets every man more or less after he has left it.

(To be continued.)

Digitized by Google

The Railways of the Isle of Wight.

By H. M. ALDERMAN.



NO. 11. ISLE OF WIGHT CENTRAL RAILWAY.
Originally a L. B. & S. C. R. locomotive.

OF the lesser railway systems of Great Britain, probably the most important and the best known are the three lines which, between them, share the traffic of the Isle of Wight.

The beautiful "Garden Isle," with its delightful unspoilt marine resorts, each with its own individual climate and natural attractions, the breezy rolling downs, and last but not least its old-world villages nestling in the valleys, places as yet untouched by the energies of the speculative builder, is justly known and famous; and few there are who have not at some time or other spent a healthy holiday there. Indeed, one may safely assert that no other 54 miles of line within the British Isles, serves so many and so varied health and pleasure resorts.

The Island is very hilly, the greatest altitude being reached by St. Boniface Down, 783 ft. A chain of chalk hills or downs runs through the centre from Culver Cliff, near Sandown, to "The Needles," whilst the southern part, known as the "Back of the Wight," from Shanklin across to Brighstone Bay, presents a very difficult surface for railway engineering.

Isle of Wight Central Railway.

Of the three railways the Isle of Wight Central calls for first attention. This company was formed under Act of Parliament, July, 1887, by amalgamating three small lines, the Cowes and Newport (incorporated in 1859), the Isle of Wight Newport Junction (incorporated in 1868), and the Ryde and Newport (incorporated in 1872), whilst the Newport, Godshill and St. Lawrence Railway from Merstone Junction to Ventnor Town, previously worked by the Isle of Wight Central Railway, was acquired under Act of Parliament 1913, as from July 1st, 1913. The Freshwater, Yarmouth and Newport Railway Company's line (referred to later) was until the end of June, 1913, worked by the Isle of Wight Central Railway as part of their system.

Newport, the capital of the Island, possesses the largest station. There are four platforms, and the administrative offices are located adjacent to the station. From Newport radiate various branches together serving the greater part of the Island area.

1. Newport to Cowes 4 miles 28 chains. This line follows the estuary of the river Medina. Parkhurst Barracks and the famous Parkhurst Prison are to the left of the line shortly after leaving Newport. There is one intermediate station at Mill Hill, Cowes.

2. Newport to Ryde 8 miles 61 chains (to St. John's Road). Intermediate stations are provided at Whippingham (for Osborne and Whippingham church, celebrated by reason of their association with Queen Victoria and the Prince Consort), famous for its one-time station mistress; Wootton; Haven Street and Ashey (Ashey race-course is to the right of station). From Ryde (St. John's Road), running powers are exercised over the London, Brighton and South Coast and London and South Western Joint Railways to the pier terminus, Ryde (Pier Head).

3. Newport to Sandown 9 miles 7 chains. This section follows the course of the Medina for some distance. There are stations at Shide, Blackwater and Merstone. Thence the line passes through Horringford (for Arreton), Newchurch and Alverstone, following the course of the River Yar, then rising sharply before entering Sandown

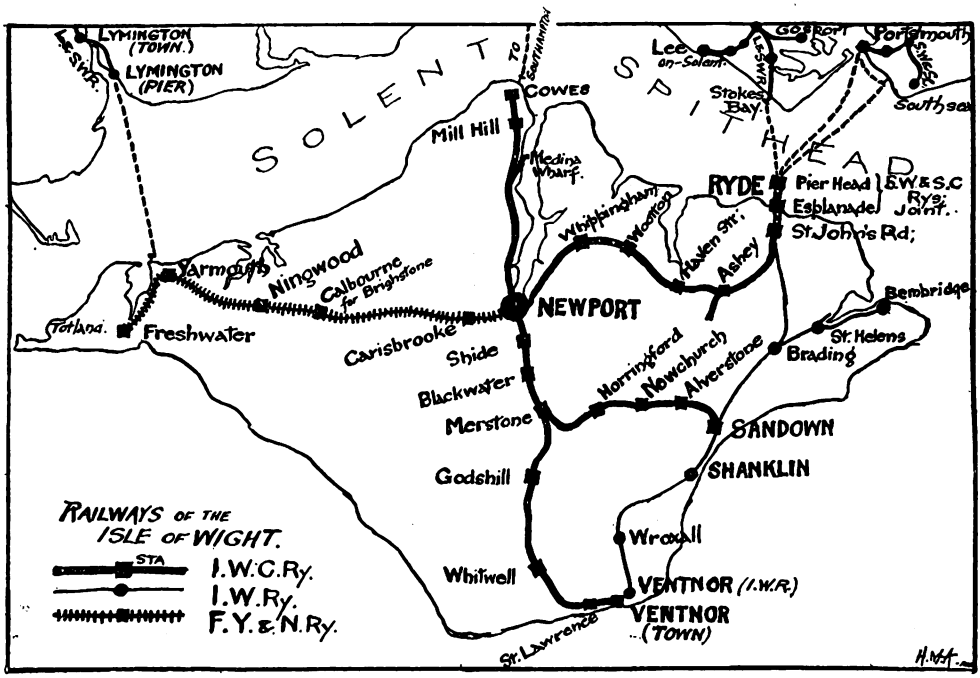
Digitized by Google

station, where a junction is made with the Isle of Wight Railway.

4. Newport to Ventnor Town (6 miles 69 chains in length) from Merstone. The Sandown line is used as far as Merstone, the line then passing through Godshill, the prettiest old-world village in the Island, Whitwell and St. Lawrence to Ventnor Town.

Among the principal engineering works on the line are the brick viaducts, at the junction of the Ryde and Sandown lines at Newport, carrying the former branch over the gasworks area and the latter across Newport High Street. These viaducts are. respectively 300 ft. and 700 ft. in length, with a height of 25 ft. The draw-bridges carrying the Ryde and Sandown lines over the River Medina at Newport are also interesting. These bridges are in two sections, being opened by means of hand gearing, with a cam arrangement, whereby one portion of the bridge is lowered so that it can be run under the fixed portion. By this means barges are enabled to pass to and from Newport Town Quay, there being insufficient clearance for the masts when the bridges are in their normal position.

Permanent way is partly laid with double bull-head rails, 80 lbs. weight to the yard, chairs 32 lbs. weight fixed to sleepers 9 ft. by 10 in. by 5 in. and partly flat bottomed rails. The whole of the line has been recently re-ballasted with shingle, in place of the local freestone previously employed. Gradients are severe in many places, the hardest being 1 in 54 for half a mile between Sandown and Alverstone, and 1 in 55 for 1 mile 62 chains between Whitwell and St. Lawrence, whilst 1 in 58, 1 in 60, 1 in 63, 1 in 64, 1 in 66, 1 in 68 are frequent. There are three tunnels, the longest (754 yards) between Whitwell and St. Lawrence, the others being Cowes, Mill Hill (198 yards) and Newport, on the Ryde line (78 yards).



There are 23 "over" bridges and 53 "under" bridges and six level crossings. The line is single throughout, with crossing places and up and down platforms at Ashey, Whippingham and Whitwell stations, Merstone having an "island" platform. Traffic is worked under electric train tablet system between Ryde, St. John's Road and Ashey, Ashey to Whippingham and Whippingham to Newport on the Ryde line, Newport to Shide, and from Shide to Merstone on the Sandown line, and between Cowes and Newport. The remainder of the system is worked by train staff and ticket, under "Absolute Block Regulations." It speaks

Digitized by Google

well for the careful working and maintenance of the line that no fatal accident has ever happened to any train on the Isle of Wight Central Railway.

One of the most interesting features of the line are the locomotives and rolling stock. The company possesses eleven tank engines; four of them are 2-4-0, four 0-6-0, one 0-4-0, one 0-4-4 and one 4-4-0. The standard colour is black with white lines, and initialled I.W.C. on the sides. The passenger stock consists of 40 coaches (the longest being 37½ ft.) and 13 other coaching vehicles, with natural teak and mahogany varnish finish. They have all recently been re-decorated and vastly improved by the installation of gas-lighting in place of the old oil lamps. The Westinghouse brake is in use.

At one time the fares (as on other Island railways) were very anomalous; the last General Manager, Mr. Chas. L. Conacher, introduced many reforms in this direction, but the present General Manager Mr. Russell Willmott has thoroughly and boldly taken the matter in hand, all trains now being first and third class and the fares reduced to 1½d. and 1d. per mile respectively. The wisdom of such a course has been fully demonstrated by the success of the venture.

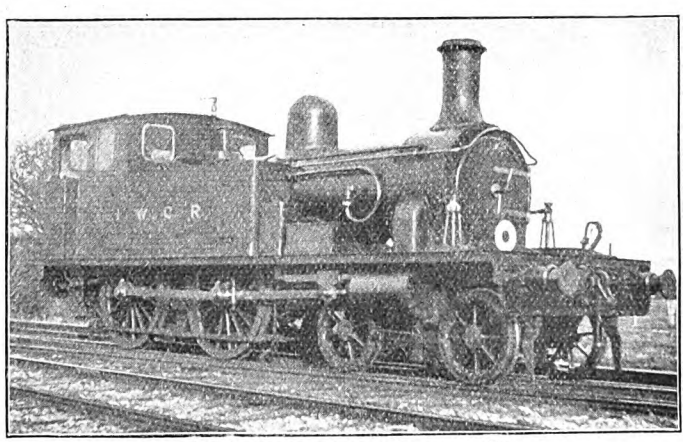
There are, of course, many kinds of cheap and special tickets and the like issued, but the writer remembers seeing notices on the Ventnor Town line some few seasons ago, intimating that cheap tickets would be issued by certain trains to Godshill, for the daffodil fields at Sandford near that place, during the flowering season—probably a unique cheap-ticket issue for an English railway.

One can hardly expect to find a large amount of goods traffic on a line like the Isle of Wight Central Railway. Conditions are against it: the Island is residential around the coast; inland, agricultural; the only industries are ship and yacht building with allied trades at East and West Cowes; cement works near Newport. The ship and yacht building brings little or no goods traffic to the railway, as everything required is brought by water and unloaded direct into the yards, which is also the case with the general trade of Newport, whilst it is easily understood that haulage by road between the chief towns presents no longer distances or greater labour than obtain in carting to and from railway stations in agricultural Wiltshire or Lincolnshire. These disadvantages notwithstanding, however, the goods and mineral traffic is considerable, coal discharged from vessels at Medina Wharf near Cowes—the property of the Isle of Wight Central Railway—forming an important item.

The present goods rolling stock consists of 233 open wagons, 11 timber trucks, 47 covered wagons, 8 cattle trucks and 4 brake vans and 5 miscellaneous vehicles, the largest wagons being 20 ft. long. During 1913, the goods traffic amounted to—merchandise, 23,003 tons; coal, coke and patent fuel, 79,057 tons; other minerals, 56,475 tons and 16,645 head of live stock.

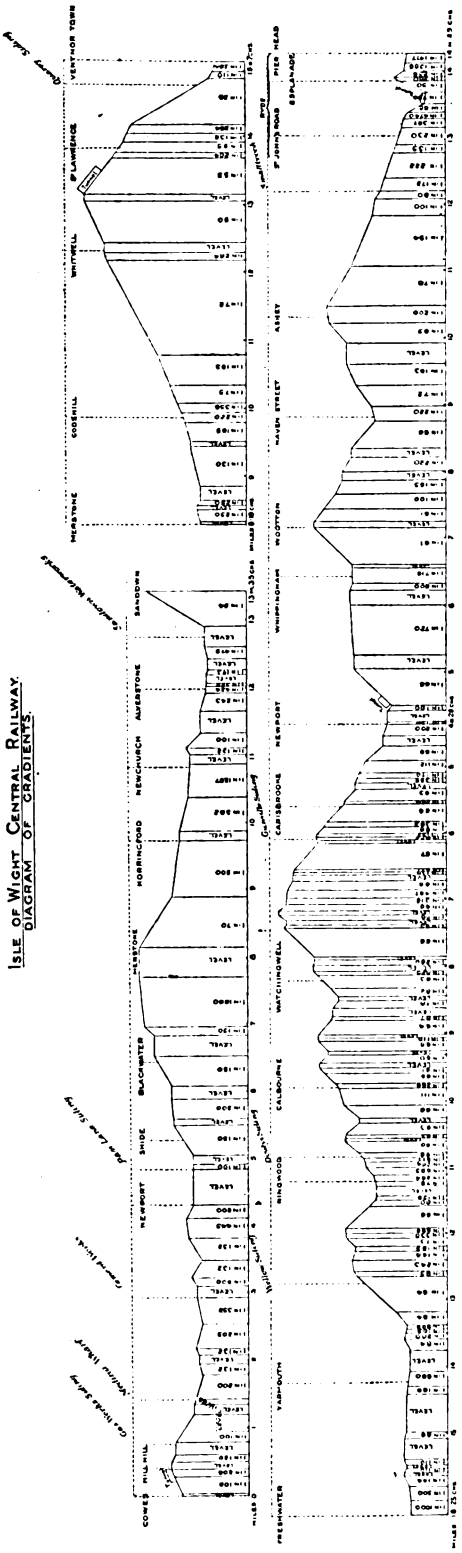
The traffic mileage for 1913 was passenger, 203,776; goods, 36,879; shunting and piloting, 22,962; number of passengers carried during the same time—1st class 28,013; 2nd class 21,879; 3rd class 805,736. The company have 239 men in their service, distributed amongst the various departments as follows:—Clerical staff 21; traffic 81; locomotive carriage and wagon 57; permanent way 50; and coal gang 30, employed at Medina Wharf.

The present Secretary and General Manager, Mr. Russell Willmott—he is also Engineer and Locomotive Superintendent—has by his progressive administration of the line raised it to a pre-eminent position. The recent half yearly announcements are a striking testimony to that gentleman's "forward"



4-4-0 TANK LOCOMOTIVE NO. 6.

Digitized by Google



policy, the proprietors being delighted to hear of dividend on capital which had not previously paid any return.

To Mr. Russell Willmott the writer tenders his heartiest thanks for the interesting details placed at his disposal for the purpose of this article, in so far as the Isle of Wight Central Railway is concerned.

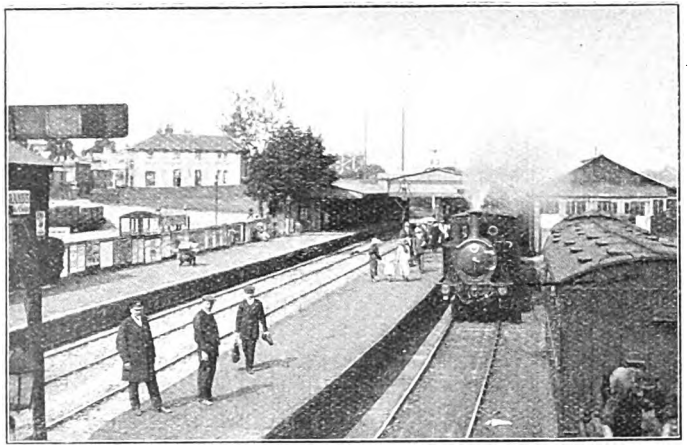
The Isle of Wight Railway.

This railway, incorporated in the year 1860 and opened for traffic on August 23rd, 1864, affords the most direct route between Ryde Pier Head and Ventnor, 12 miles in length. Trains start from Ryde Pier Head station, using Joint London, Brighton and South Coast and London and South Western property as far as Ryde (St. John's Road) station, where the Isle of Wight Railway commences. Thence, as far as Smallbrook Junction there are two single lines, both belonging to the Isle of Wight Railway, but one is used extensively by Isle of Wight Central trains. Beyond the junction the Isle of Wight Railway proceeds to Brading, at which place a branch line 2¾ miles long is thrown out on the left, and known as the Brading Harbour branch, to St. Helens and Bembridge, the latter being an extremely popular resort, and having a station at each of those places. Formerly, as the name implies, there was a shallow harbour, which gave to the ancient town of Brading some sort of access to the sea at Bembridge. It was left to the notorious "Liberator" scheme to "reclaim" this harbour site, which is now turned into very valuable grazing land, and on which has been constructed one of the prettiest 18 hole golf links in the Kingdom.

From Brading the line passes through the beautiful resorts of Sandown and Shanklin, Ventnor, Sandown (junction with the Isle of Wight Central Railway) and Shanklin, but with no view of the sea. The 18-hole golf links at Sandown are claimed to be among the finest in the Kingdom. Close to Shanklin the line bends sharply inland to pass round the base of St. Martin's and Shanklin Downs. Appuldurcombe House and Park can be seen on the right just before Wroxall station is reached. This has been described as the finest mansion in the Island, standing in a park of some 500 acres. It dates from 1710 and "consists of a square central block with four smaller square blocks or wings, one tacked on at every corner—every side of the house displays a front in the corinthian order." The place has seen many vicissitudes. Formerly the seat of

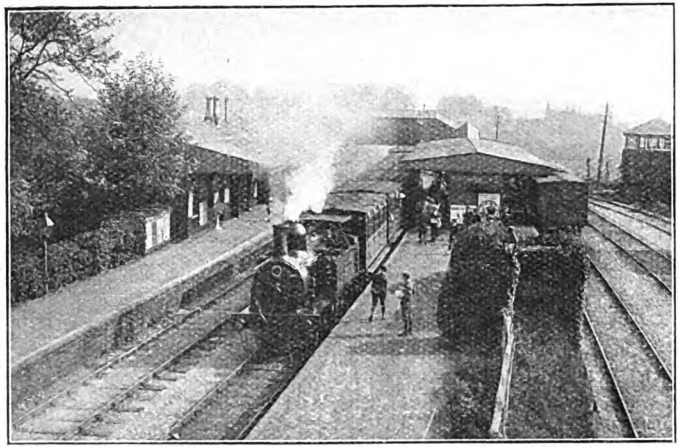
Digitized by Google

Digitized by Google



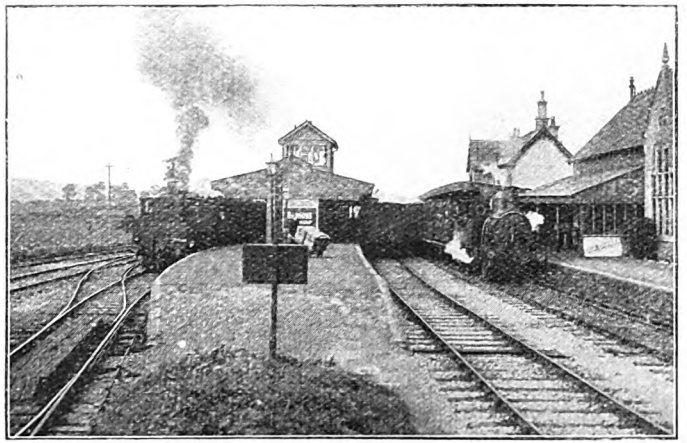
G. H. Ancell] [*Sandown.*

RYDE (ST. JOHN'S ROAD) STATION.
Isle of Wight Railway train.



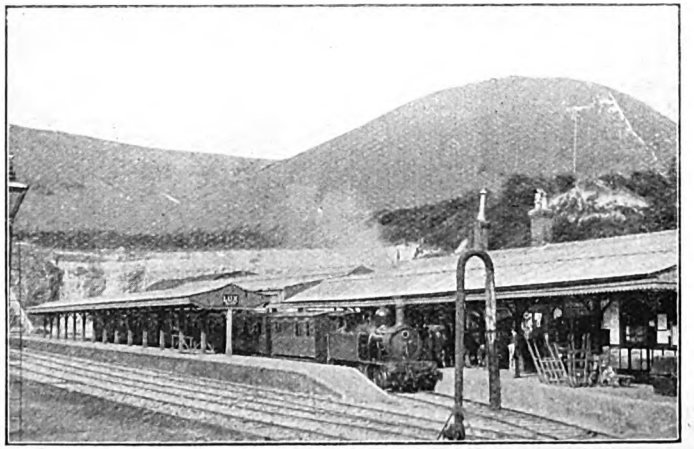
G. H. Ancell] [*Sandown.*

BRADING STATION, ISLE OF WIGHT RAILWAY.



G. H. Ancell] [*Sandown.*

SANDOWN STATION.
Isle of Wight Railway train to right, Isle of Wight Central train to left.



G. H. Ancell] [*Sandown.*

VENTNOR STATION; ISLE OF WIGHT RAILWAY.

Digitized by Google

of uniform design and finished externally in natural teak varnished. Included are several commodious saloons which are much appreciated by the public. Carriages are lit by electricity. The automatic Westinghouse brake is in use. There are 227 goods vehicles of various description. The Engineer and Locomotive Superintendent is Mr. H. D. Tahourdin. The locomotive, carriage and wagon shops are at St. John's Road, Ryde. Permanent way is of sound construction. The line is single throughout with " passing loops " at all stations except St. Helens and Wroxall, Stations are well built and the line and rolling stock are maintained in a very creditable condition. As in the case of the Isle of Wight Central Railway, coal forms the chief item on the goods side being transhipped, at St. Helens Quay on the Brading Harbour branch.

The Company is now issuing tickets on the mainland basis, *i.e.*, 1d. per mile by all trains, in addition to which they originated, the system which has been followed by many other Companies, viz., the issue of weekly season tickets. These have proved very popular. The passenger traffic on this line is heavy, over a million tons being carried during 1913. There is an excellent service of trains, 13 each way in the winter and 17 in the summer.

The general offices of the company are at Sandown station, Secretary and General Manager, Mr. H. K. Day.

The Freshwater, Yarmouth and Newport Railway.

This railway was incorporated on August 26th, 1880, and opened for goods traffic in 1888 and passenger traffic in 1889. It connects Newport and the Isle of Wight Central Railway with the rapidly growing Freshwater district—known as the " Tennyson country." From the opening date up to the end of June, 1913, worked as a part of the Isle of Wight Central Railway system, but is now conducted as a separate concern. A new station has been erected at Newport on the curve near the junction with the Isle of Wight Central line, and the latter company's station. Close to Newport station is the chief engineering feature of the entire railway, the iron viaduct, 576 ft. long and 20 ft. high, carrying the line over one of the main thoroughfares of the town—The Town Gate. Further reference to this railway was made in our last issue. Trains now work into the Isle of Wight Central Station at Newport, so that former connection facilities are again available.

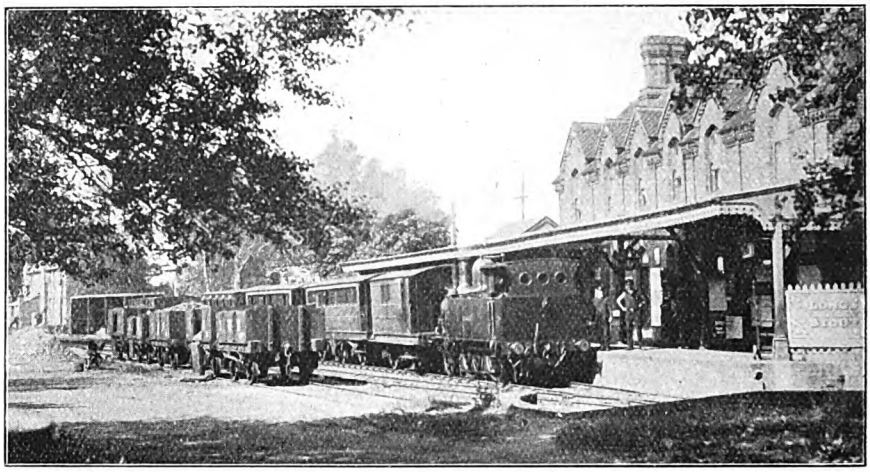
Ryde Pier and Railway.

This undertaking was carried out to give better communication with the mainland jointly by the London and South Western and London, Brighton and South Coast Railways in the year 1880, and as its name implies gives direct communication between rail and steamer. Including the pier section, the railway is about 1¼ miles long, extending to Ryde (St. John's) station. The railway pier, some 2,300 ft. in length, is unique by reason of its being the only one on the coast of these islands having a complete railway station at its head, and the whole forming a complete " section " for train signalling purposes. There is one intermediate station, Ryde Esplanade. Between that station and St. John's Road is a tunnel about 30 chains in length, the descent into which from the Esplanade end is 1 in 50 for a short distance. The Pier Head and Esplanade stations are staffed by Joint South Western and South Coast Railway officials, the trains being those of the Isle of Wight and Isle of Wight Central Railways.

The suggestion has many times been made to construct a railway tunnel under the Solent or Spithead. The late Sir Blundell Maple was keenly interested in the matter, and many people hold the opinion that, but for that gentleman's decease, the scheme would now be an accomplished fact. The idea has of late come prominently to the front, the suggestion now being made that a tube should be made from Stokes Bay to Ryde, or other convenient part. The Isle of Wight County Council have promised their support, but will not pledge themselves financially, although lesser public bodies in the Island are urging support of that nature on the part of the County Council.

That the scheme is taking shape is shown by the inclusion among the Railway Bills for consideration during the present Parliamentary session of the proposed South Western and Isle of Wight Junction Railway. A line is projected from the London and South Western main line between Southampton and Bournemouth to the Island coast at a point near the Isle of Wight.

Digitized by Google



G. H. Ancell,] [*Sandown.*

BEMBRIDGE STATION; ISLE OF WIGHT RAILWAY.

Whatever the future may bring forth in the shape of direct rail communication, the beneficial effect of such a project are fully recognised.

Traffic to and from the Island is conducted by the London and South Western and London, Brighton and South Coast Railways. Both of these companies offer exceptional facilities. The London and South Western gives a choice of three routes.

(*a*) Waterloo to Portsmouth Harbour, thence by steamer to Ryde. On this service, breakfast, luncheon and dining car services in both directions were introduced in 1912.

(*b*) From Waterloo to Southampton, with through trains from the Great Western Railway, the Didcot and Newbury line *viâ* Winchester and from the north over the Midland and South Western Junction Railway *viâ* Andover; boat service to Cowes, and direct trains for Newport and the Ventnor Town line. . .

(*c*) From Lymington Pier (a short branch from Brockenhurst off the main Bournemouth line) to Yarmouth Pier, giving a quick service to the Freshwater district from London, also a convenient route from the west of England.

The London, Brighton and South Coast Railway offers a speedy service of trains from either Victoria or London Bridge to Portsmouth Harbour, in connection with Ryde steamers, and from the south coast towns served by this company—Hastings, Eastbourne, Brighton, etc.,—trains are run connecting with the Island boats at Portsmouth Harbour.

On both companies lines passengers can book from most stations to any station in the Isle of Wight, either ordinary, week-end or tourist. London return tickets are available by either companies' route from Portsmouth Harbour. Special facilities are given to attract motorists to tour the "Garden Isle." Motor cars can be shipped at Portsmouth on special boats and conveyed by fast tugs to Ryde, whilst similar facilities are to be had at Lymington for shipment to Yarmouth.

Train services on the Island railways are in connection with the boat services at Ryde and Cowes. Amongst other holiday and excursion tickets issued special favour is given to the weekly season tickets, 1st and 3rd class, on the Isle of Wight Central Railway, available at all stations on that and the Freshwater, Yarmouth and Newport lines.

Digitized by Google

Long-Distance Travelling on the South Eastern and Chatham Railway.

By J. G.

ONE of the most remarkable developments of recent years in the railway world is undoubtedly to be seen in the rapid increase of the holders of what may be called "long-distance season tickets." But since this term technically includes the host of commercial travellers, "traders," professional sportsmen, and others of the great army of those who use the railways in the way of their business, it is necessary to preface this article by noting that the only season ticket holders it proposes to discuss are those who, tempted by the amenities of some favoured spot, voluntarily submit to be daily carried long distances to and from their business in town. Such have, of course, existed almost since the mediæval period of railways in this country, dauntless souls who dared the journey—generally to Brighton. But their numbers were confined to the few able to afford leisurely hours and comparatively high fares, and it was not till recent times that equal facilities could be enjoyed by their fellows of the middle classes.

Now, however, that the gateways to the open country and the coast have been opened to the many, it seems probable that the next few years will see a vast increase in this traffic. Year by year the competition of other carrying companies renders the suburban returns of the railway less valuable, while the changing conditions of the Inner Belt force the middle-class householder farther and farther afield, until at last the point is reached where he has to pause and consider whether he might not with advantage exchange his present service for the higher speeds of the main-line express.

A remarkable instance of this process is afforded by the South Eastern and Chatham Railway. The industrial growth of South London has exiled thousands of families from miles of once pleasant residential suburbs, while their consequent exodus into the Outer Belt has in turn rendered the newer train services there provided for them congested and slow. The South Eastern and Chatham Railway was exceptionally fortunate in that it was able to offer to its patrons an almost unlimited extent of coast line with real cliff, real sand, and, above all, real sea. The charms of a settlement upon it were known to a small company of adventurers even in those dark ages, which it is the misfortune of one section of our alert halfpenny press not to understand have passed for ever.

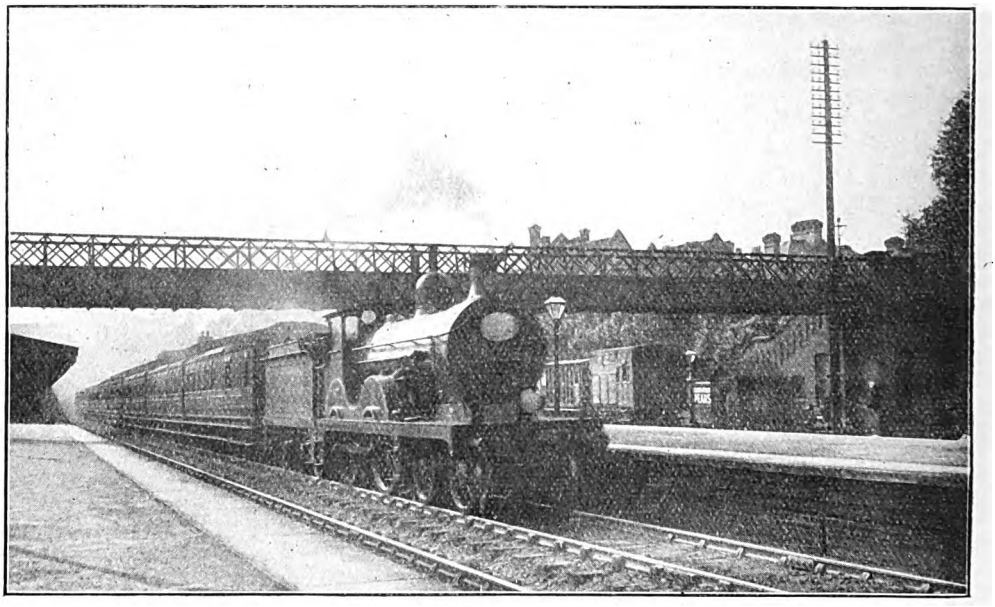
To reach London before 10 a.m. from Ramsgate, Broadstairs and Margate has now long been possible, leaving again at 5.10 and returning to Ramsgate by 7 p.m. The residential traffic, however, remained almost negligible till some few years ago, when the Managing Committee resolved upon the experiment of issuing season tickets to and from the coast at specially reduced fares, available only between the London termini and certain specified towns, and not permitting of intermediate break of journey. About £6 10s. a quarter, second class, is charged for these "special" tickets, whether for the 58¾ miles to Whitstable, or the 79 miles to Ramsgate Harbour. There is a correspondingly reduced first class fare. In each case a 5 per cent. duty has to be paid in addition. The tickets are available over either the London, Chatham and Dover or the South Eastern route, and the neighbouring coast towns are usually bracketed in pairs, so that the holder of the Broadstairs ticket, for instance, may besides using his own station, also either commence his journey at Ramsgate Harbour or travel from the Town Station by the South Eastern route. Westgate passengers may similarly use Margate Sands station, soon to be closed to passenger traffic. Since, however, he would not be permitted to alight on the way, he would in practice hardly ever use this alternative route, which, though picturesque, is considerably longer. Whitstable travellers willing to forego the privilege of an extra hour or so on the old Harbour line to Canterbury West, and so round by Ashford, and to be confined to the direct Faversham route, pays 5s. less, while to Tunbridge Wells, which enjoys brevet rank as an inland resort, £5 15s. is charged.

Digitized by Google

This innovation proved an immediate success, tapping an entirely new source of traffic, and Hastings, Bexhill and Folkestone, as well as Herne Bay and Thanet, began to be discovered by the suburbanite in search of a home. It is with these latter resorts of the northern Kent coast that we are now concerned.

Five years ago the first morning train left Ramsgate Harbour at 7.5, and stopping all down the coast to Whitstable, reached Cannon Street *viâ* the Chislehurst loop, after calls at Sittingbourne, Chatham and Rochester, at 9.23. The second train, leaving at 7.55 and running fast from Faversham, arrived at 10.6. After this there was nothing but a slow at 8.50 until the "Granville" at 10 a.m., non-stop from Westgate to Herne Hill The two principal down trains suitable for the season ticket holder were the 5.10 p.m. *ex*-Holborn, non-stop from St. Paul's to Margate (74 miles), with a slip portion detached at Faversham (52 miles), and the 6.15 p.m. *ex*-Cannon Street. This last ran *viâ* Gravesend and Strood, arriving at Ramsgate—calling only at London Bridge, Gravesend, and Chatham, before reaching Faversham—at 8.42 p.m. Between these the 5.36 p.m. *ex*-Victoria had a slow portion—now discontinued—to the coast.

This service, though not exactly brilliant, was probably quite as good as the traffic warranted. It must be remembered that the pioneers of the season ticket were then a tiny band indeed, while the comparative absence of large centres on the line precluded the existence of any other regular source of express *clientèle* to justify special provision. At all events, the service seemed as good as could at that time be looked for, and the principal grievance complained of lay, not in any inadequacy of the trains, but in the lack of accommodation reserved for those who were the longest distance patrons of the line. Since the first train up was always subjected to an incursion at Chatham, while the 6.15 p.m. down was for the first part of its journey almost monopolised by Gravesenders, privacy was, under existing circumstances, impossible.



Photo] [*E. A. Gurney-Smith.*

DOWN "GRANVILLE" EXPRESS PASSING BROMLEY (SOUTH). LOCOMOTIVE No. 577.

It was only natural that amongst those who, travelling distances up to 50,000 miles a year, spent so large a portion of their time in each other's society, a spirit of camaraderie should spring up, and it was as an expression of this feeling that in the December of 1911 a few of the regular passengers from the coast to London arranged an informal dinner and meeting at Canterbury, that town being selected as equally accessible

Digitized by Google

to all alike. As the result of this gathering, the "Association of Regular Kent Coasters" came into its corporate being. Its professed objects were fourfold: (1) To advocate the attractions of the Kent coast towns as residential centres for London professional and business men, (2) to promote friendly intercourse among the regular travellers on the Kent coast trains, (3) to suggest to the railway management from time to time, as may be considered desirable, improvements in the train service, etc., (4) to obtain special concessions from the railway management, such as reserved saloons and compartments on the Kent coast trains for the use of members of the Association.

In the two years since its inception the Association has been singularly successful in every branch of its activities. A general meeting was held in Margate and a committee elected, each town from Ramsgate to Faversham being represented by one or more members. This last, though not a coast town and not privileged with the special rate, has a few season ticket holders to London, as also has even inland Canterbury.

The Managing Committee being waited on, showed themselves not unfavourable to the new Association, and were persuaded, though against their previous policy in dealing with season ticket traffic, tentatively to reserve two compartments for the use of members using the 7.55 a.m. up and the 5.10 p.m. down train. But so successful was the experiment shown to be in the early months of 1912, when the services of the company were disorganised by the coal strike to such an extent that the daily long-distance journey would have been impossible had it not been for the reserved carriages, that it was resolved to continue them.

The next step was to ask for a saloon to be attached to the second train Up, and the fast portion of the 5.10 Down, and here again the Managing Committee, though at first doubtful as to whether the traffic could bear the extra dead weight on one of its fastest trains, showed itself willing to experiment.

Again the venture proved a decided success. Averaging a full nightly complement, the long saloon is now a permanent feature of the "City Express," while the curiosity which its reserved label invariably provokes amongst strangers to the train, is a proof of the advertisement afforded at once to the Association and the railway. In this matter no further difficulty has been met, and the Association now has saloons running

MR. G. H. MARE.
Secretary, Association of Regular Kent Coasters.

on the three principal up trains, and on two of the down trains, as well as reserved compartments on the third down train and on the "slip" portion of the 5.10. Indeed, the Managing Committee, while undoubtedly considering its own interests, has been generous as well as just; not only has it given of its best out of its rather limited special rolling stock, but it has furnished its saloons with tables for the games that seem inseparable from this class of journey.

The Association of Regular Kent Coasters began its ventures with a nominal subscription of 1s. per annum per member, to cover secretarial expenses. Its saloons are free to any member in possession of a second-class season ticket. The company, therefore, while finding in it a most valuable advertisement, has also to consider the claims of its first-class passengers paying a higher rate for superior accommodation. It also reserves, of course, the right at any time to withdraw the saloons, or to fill them up with its ordinary passengers should occasion demand. This right, however, it has never yet exercised, and is, in fact, careful to station an official at the door of its reserved carriages.

Carefully confining itself to the modest function of discriminating suggestion, the

Digitized by Google

support of the Association is now eagerly canvassed by the various District Councils and Advancement Committees interested in the coast service. The principal alterations which have been made recently in favour of this residential traffic are as follows: The old 7.5 a.m. *ex*-Ramsgate now starts a quarter of an hour later, and stopping only at Broadstairs, Margate West, Herne Bay, and Whitstable, reaches London at 9.18 a.m. The 7.55 a.m. up train now runs 10 min. earlier, and is in the summer months non-stop from Margate West (8.1 a.m.) to Cannon Street (9.36 a.m.); this train, which is routed *viâ* Gravesend and Woolwich, during the rest of the year makes an additional call at Herne Bay. The remaining coast towns are served by the old 7.55 a.m., which runs as before, but starting from Margate at 8.9 a.m., arrives at Cannon Street at 10.1 a.m.

On the down journey the chief improvement has been the inauguration of an entirely new and much wanted express running out of Victoria every night at 6.10 p.m. *viâ* the Catford Loop and Sole Street, first stop Whitstable, and reaching Ramsgate at 8.10 p.m. Like the first morning up train, this passes Birchington and Westgate, doubtless to the benefit of their larger neighbours. The 6.15 p.m., too, has been dignified by a new summer only non-stop run from Faversham to Margate, the intermediate stations being then served by a following slow along the branch.

On the social side, the Association of Regular Kent Coasters has not been idle: it has arranged sports and an inter-town billiard tournament, while by taking the chair at its recent annual dinner, the Member for Thanet, Mr. Norman Craig, K.C., invested it with the cachet of success. With the South Eastern and Chatham Railway its relations have been of the happiest. Mr. G. H. Mare has been the Honorary Secretary of the Association since its formation, and much of its development and success is due to his energy and tact. With the railway servants the Association is on equally good terms. In 1913 the subscription was raised to 2s. 6d., and after deducting the usual necessary expenses, a balance of £10, or roughly 70 per cent. of the total income, was voted to be distributed by the company in gratuities to the drivers, firemen, and guards working the trains used by the Association. In addition to this, a private subscription among the members was raised at the end of the year, and £5 5s. was sent to the Railwaymen's Convalescent Home at Herne Bay. In response to this, Sir William Hart-Dyke, Chairman of the London, Chatham and Dover Company, asked that the Association should be represented at future dinners of the fund. For 1914 the subscription has been still further raised to 5s., principally with the idea of keeping out the casual summer passenger who takes out a monthly season ticket, and no doubt the Committee will again vote the surplus to charity.

The highest number of members has been 210, practically all second-class daily passengers. It is curious to notice that Herne Bay contributes the greatest quota, followed by Margate, Whitstable and Broadstairs. A more striking instance of the advantages of co-operation would be hard to find than this comparatively small Association, which by promoting the comfort of its members, virtually gratuitously, has made possible to many a journey of, in some cases, 1,068 miles a week. It has always been a serious question as to whether the nervous strain imposed upon many by so long a daily journey does not more than neutralise the undoubted advantages gained by residence in the free air of the open coast. The present writer was sufficiently anxious upon this point as to take medical advice, and was told that nothing need be feared so long as no dislike of the journey was experienced. Thanks to the Association, the four hours spent daily on the train have become not the least pleasurable part of the daily routine, and occupied as they are in comfort and companionship, seem no longer than the lonely minutes of pariah-like isolation from some dingy suburb.

To have bridged the miles betwixt Margate and the Monument, and to have helped to make Broadstairs as accessible as Brixton is an achievement indeed, and one that if copied may do much in years to come to solve the many problems arising out of the congestion of our huge cities.

Digitized by Google

Photo] [*Wohlgemuth & Co.*

PARTICK STATION.

The Glasgow City and District Railway

[No. II.].

By CHARLES C. LITTLEJOHN.

PROCEEDING southwards by rail from Great Western Road station, the apex of another triangle is presently reached at Whiteinch North Junction. To the left the City and District continues on by way of Whiteinch East Junction, and to the right a spur line joins the Glasgow, Yoker and Clydebank Railway at Whiteinch West Junction, and from there runs southwards to Victoria Park, Whiteinch, a distance of half a mile. Victoria Park, it may be recalled, is another of the suburban terminal stations to which I referred in introduction, and accommodates principally the short-distance local trains to and from Hamilton, Milngavie ("Circle" trains) etc. The service only numbers about a dozen trains in each direction daily, and all trains run *viâ* Queen Street Low Level—that is, none proceed north by way of Great Western Road. Indeed, the spur between Whiteinch West and North Junctions (19 chains in length) is ordinarily used only for goods traffic with, I believe, a single exception in summer. On Saturdays the 8.32 a.m. passenger train *ex*-Fort William is, or used to be, diverted *viâ* Clydebank and Great Western Road, thence to Queen Street High Level station, instead of running *viâ* Drumchapel and Knightswood North Junction. The apparent reason for this is to avoid delay from a work-people's train from Singer.

The Clydebank Railway, of course, forms the alternative route to and from Helensburgh already mentioned, and joins the old line at Dalmuir Junction. The base of the triangle between Whiteinch East and West Junctions is occupied by Jordanhill station, which serves a modern residential district. It is served by both Clydebank and Victoria Park trains.

The City and District now skirts the extensive grounds of the large Gartnavel Asylum to Partick Junction, where it is joined by a short branch from Hyndland. This line is 52 chains in length, and forms part of the City and District Railway proper, although detached from the other portion of the latter system by an intervening stretch of the old Stobcross Railway. Hyndland is the terminus of most trains on the Airdrie, Coatbridge and Hamilton sections, including most of the through trains from Edinburgh (Waverley) by the former route. It is situated in a

Digitized by Google

fashionable residential neighbourhood, within ten minutes of the city, and for this reason is popular with business gentlemen, to whom the time spent daily on travelling is a consideration. Here it may be mentioned that a few years ago any of the latter who chanced to be in London and were about to return home could be conveyed direct from the busy Metropolis to their Glasgow suburb without change of carriage. On the 11.20 a.m. summer express *ex*-King's Cross might be seen two up-to-date East Coast coaches with destination boards lettered "King's Cross and Glasgow (Hyndland.)" The explanation is that these particular vehicles were run from Edinburgh to Glasgow on the 8.15 p.m. train *ex*-Waverley by the Coatbridge route, instead of *viâ* Falkirk to Queen Street (High Level). During the last three years the 8.15 p.m. from Edinburgh has run to Milngavie instead of Hyndland, taking the English coaches with it all the way. Milngavie residents have thus the unique privilege of a through service daily during the summer months from London to their picturesque town (the population of which is merely about 4,500), 445 miles distant! In conclusion, it may be mentioned that Hyndland, like Bridgeton Cross in the East End of Glasgow, is an important carriage depot for the district. Passenger trains number about 30 in each direction daily, and no goods traffic is worked on the branch, with the exception of one pilot trip to and from Partick Junction each morning.

Partick station, next reached, may safely be described as the busiest one on the City and District, excepting, of course, Queen Street (Low Level). Partick has always ranked as one of the most important districts of Glasgow and, until quite recently, maintained the dignity of an independent burgh. All trains call here, except one or two of the principal Craigendoran Boat Expresses, and in summer there is an average service to and from the city every 8½ minutes. The first train is shortly after 5 a.m. and the last 11.26 p.m. During busy periods trains follow each other at practically three minute intervals: thus, to take a typical example, there are trains each morning from Partick to Queen Street (eight minutes' run) at 8.21, 8.25, 8.31, 8.34, 8.38, 8.43, 8.46, 8.49, 8.55, 9, 9.5, 9.8, 9.12, 9.15, and so on, or fourteen trains in 54 minutes—surely a service ample enough to satisfy the most fastidious.

Photo] [*Wohlgemuth & Co.*

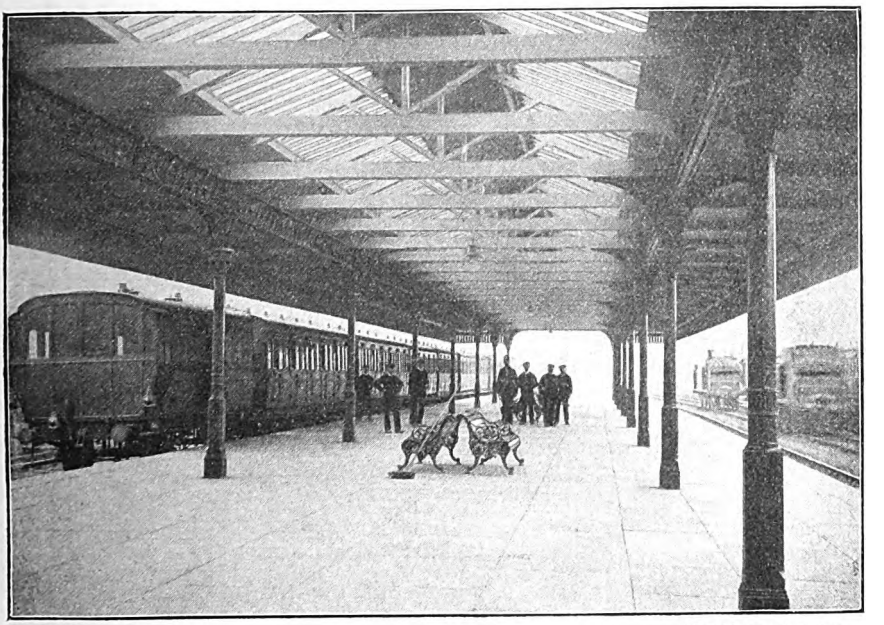
VICTORIA PARK (WHITEINCH) STATION.

From Partick the railway runs in a south-easterly direction to Yorkhill, a distance of 37 chains. This station stands high above the surrounding docks and shipbuilding

Digitized by Google

yards, close to the river, and commands a fine view of the busy Clyde with its myriads of shipping. Comparatively few trains stop at Yorkhill—none later than 6.5 p.m.—and workmen form the largest proportion of passengers using the station.

At Kelvinhaugh Junction, 33 chains from Yorkhill, a line for mineral traffic branches off on the right and descends sharply to the level of the docks, where a connection is formed with the Caledonian (Low Level) line. An engine-shed is provided at Kelvinhaugh Junction for locomotives working in the district. Stobcross Junction, 12 chains further east, adjoins the large joint goods station of the North British and Caledonian Companies, termed Stobcross High Level to distinguish it from the Low Level depot beside the docks. Traffic for shipment is conveyed to the latter and is thence loaded direct to the various steamers from rails on the quay-side. At Stobcross Junction the City and District section proper of the North British Railway is entered upon. The line was constructed independently and opened on 15th March, 1886, and was amalgamated with the North British system the following year. Including the Hyndland branch, it was $2\frac{3}{4}$ miles in length, and with the Union Railway Extension from Bellgrove to Springburn it completed the North British Circle round Glasgow. The line descends rapidly from Stobcross Junction to Finnieston, which station is situate below the level of the street, just before the underground portion begins. This station is only a few minutes' walk from the main entrance to the beautiful Kelvingrove Park, and the two Exhibitions held there in 1901 and 1911 respectively had the effect of considerably augmenting the passenger traffic to and from the city. Otherwise, season ticket holders comprise the majority of persons using the station. Apropos of this, I may mention a rather unusual experience which I had here During the summer of 1910 I booked (first-class) from Finnieston for one of the combined rail and steamer circular tours to Loch Lomond and the Clyde Coast which the North British Railway has brought to such a pitch of perfection. The ticket I received bore the dust of many years and also the initial number, 0000—indicating, of course, the first of that particular series sold. In September of the following year a friend and I were again resident in the neighbourhood and decided to patronise the same tour. To my surprise, on booking at Finnieston we received tickets numbered 0001 and 0002 respectively! When one considers that over a year had elapsed since my previous visit, and that the Exhibition already mentioned



Photo] [*Wohlgemuth & Co.*

HYNDLAND STATION.

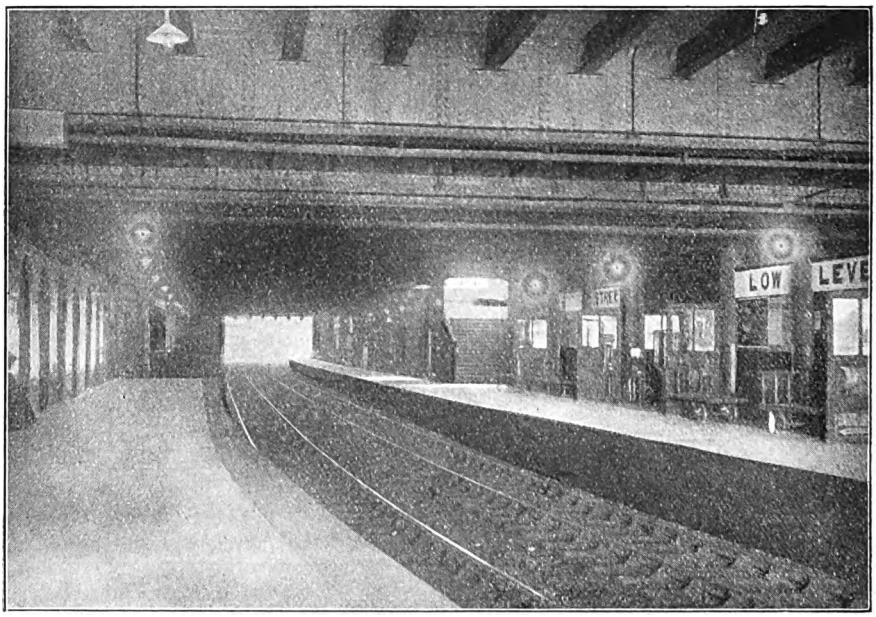
Digitized by Google

caused a large number of tourists to patronise Finnieston station, I think the case was rather unique. Out of fairness to the Company, however, let me add that the tour in question is an exceedingly popular one, but almost all who patronise it book from Queen Street or Partick, hence the apparent anomaly.

From Finnieston the railway runs east under Kent Road to Charing Cross, half a mile distant. The latter is a station of considerable importance at which most trains call and is situate in North Street, convenient to the fashionable shopping centre of Sauchiehall Street, while the principal theatre in Glasgow—the King's—is also within three minutes' walk.

terminate at Queen Street Low Level are run forward empty to one or other of the carriage depôts in the district. About 125 trains in each direction pass through the station daily, and this number is greatly augmented on Saturdays and holidays, so it will be seen that special aptitude is required for working the traffic. If from any cause a block should occur it puts the time-table out of order for the greater part of that day, but such occasions are exceedingly rare and trains follow each other with wonderful celerity.

From Queen Street it is merely another half mile underground to High Street station, whence we started, so I may conclude this article with a few remarks on



Photo] [*Wohlgemuth & Co.*

QUEEN ST. (LOW LEVEL) STATION.

To Queen Street itself is now a brief run of ¾ mile. The Low Level station is directly beneath, and at right angles to, the main terminus above, and accommodation for trains is provided by four sets of rails serving three platforms—the centre platform being of the "island" type, about 750 feet in length. Stairs lead from each to the High Level station and hydraulic hoists are provided for transferring luggage and parcels. The traffic is controlled from two overhead signal boxes, designated Queen Street East and West respectively, but, as at Finnieston and Charing Cross, no siding accommodation is provided, and any trains which may

the City and District Railway in general. The actual extent of the "circle" is 11 miles 71 chains, and the average time taken to traverse it, stopping at all stations, is about 48 minutes. Although I have purposely described the journey as a continuous one, it cannot usually be accomplished without change of carriage. This is explained by the fact that most "circle" trains, after partly or wholly traversing the circle, run to Milngavie or Torrance at the end of each trip; that is, they are not continuous "round-abouts." It will be seen from this that the circle service itself is of minor importance, as the majority of trains pass over a short

Digitized by Google

portion of it only on their way to and from other sections. The way in which these various services are linked up is shewn by the following rough classification :—

Stations from High Street to Maryhill inclusive, *viâ* Springburn—served by Milngavie and " Circle " trains (Bellgrove is also served by those to and from the Hamilton and Airdrie sections, and Maryhill by Kelvin Valley trains); Great Western Road—served by Milngavie direct, Torrance and " Circle " trains, also those to and from the Helensburgh and Balloch section *viâ* Drumchapel; Partick to High Street *viâ* Queen Street by all trains, including those to and from Clydebank, Victoria Park, Hyndland, Bridgeton Cross and the Coatbridge district. The West Highland trains to and from Queen Street (High Level) do not fall to be included in this list, as they pass all local stations, except the 3.45 p.m. *ex*-Fort William, which calls at Maryhill on Thursdays only. There is, however, an exception to the ordinary Milngavie trains in the 7.53 a.m. from the north-western suburb to the city, which, after calling at intermediate stations up to and including Maryhill, runs to Cowlairs and Queen Street (High Level), where it arrives at 8.21 a.m. During the summer months this train conveys empty to Cowlairs the two East Coast carriages off the 11.20 a.m. *ex*-King's Cross the previous day, which, as already mentioned, run through to Milngavie.

No goods or mineral traffic is dealt with on the underground portion of the City and District, consequently such trains from High Street to Stobcross require to travel round the Inner Circle *viâ* Springburn and Great Western Road—a distance of nearly ten miles against two as the crow flies. No Sunday trains are run on any section of the line, and all stations are closed on that day.

Locomotives of practically every type are employed on the various parts of the City and District—from giant " West Highlanders " of the latest " Glen " class as well as the older " 331 " type, to quaint old-fashioned saddle-tanks for shunting. The Helensburgh trains are nearly all hauled now by the Class M 4–4–2 tank engines, numbered from 1 upwards, which were built three years ago and which displaced a large number of the older 4–4–0 engines formerly employed on this route. The passenger rolling-stock is no less varied, ranging from old four-wheeled coaches to the latest in " Dandy " expresses (as I believe for a time the principal Craigendoran boat train was called), with steam-heating, electric light and other modern luxuries.

The fares in operation throughout the City and District deserve special mention before I close. These are remarkably low, largely as the result of the car competition—indeed, few cities, not even excluding the Metropolis itself, enjoy such economical travelling facilities as Glasgow. Tickets are stamped " O " and " I " signifying " Outer " and " Inner " Circle trains respectively, while those to stations on the circle equidistant or nearly so from the point of booking bear a large " E "—meaning, presumably, " either " way. By purchasing a return ticket to Lochburn at Queen Street one is enabled to enjoy a trip round the complete circle at the astonishingly low tariff of 6d. first class, or 4d. third class. This works out roughly at ½d. per mile first class and ⅓d. per mile third class—surely a minimum fare for the journey. Reference must also be made to the deservedly popular " zone " tickets which are in force. These are issued weekly and enable the holder to travel as often as he or she pleases from Monday morning to Saturday night on any particular section. The rates in every case are extremely low—thus, to take the example most appropriate to this article, a " zone " ticket embracing all the Glasgow Circle stations and also the Hyndland and Bridgeton Cross branches may be had for 2s. 3d. first class and 1s. 7d. third class!

I trust I have said enough to show the important part which the City and District Railway plays in linking up the various sections of the North British system in and around Glasgow, and I will now conclude by saying that any reader of this article visiting the latter city for the first time will be well advised to journey round the circle and see for himself the many points of interest it can show.

Digitized by Google

Bradford and Its Railways.

By S. P. THOMPSON.

BRADFORD, the metropolis of the wool world, with a population approaching 300,000, is fortunate in being served by six leading railways—the Great Central, Great Northern, Lancashire and Yorkshire, London and North Western, Midland, and North Eastern—by whose lines communication is afforded with the city in all directions. Only three of these railways, however—the Great Northern, Lancashire and Yorkshire and Midland—actually own lines leading to and from the city, the remaining companies enjoying access by reason of running powers or working arrangements, enabling them to run over one or other of the owning companies' metals.

In this way Great Central goods trains travel to and from the Great Northern Adolphus Street and City Road stations, the portion of line between Wakefield Junction and Bradford being the property of the Great Northern Company; the London and North Western reach the Bridge Street, Manchester Road and Vicar Lane Goods stations of the Lancashire and Yorkshire Company by way of Bradley Wood Junction and the Lancashire and Yorkshire line; while the North Eastern Railway runs a week-day service of passenger trains—nine in number—in each direction between Bradford (Midland) and Harrogate, the section of line between Bradford and Milner Wood Junction, where the North Eastern and Midland Joint line is reached, being Midland property. The North Eastern Company also work one train in each direction on week-days during the Summer months over the 13 miles of Midland line between Bradford and Leeds Junction, Leeds, in connection with their Scarborough residential service, and in addition run quite a number of excursion trains in the season to and from the popular Yorkshire coast watering-places and other holiday resorts in north-east England, partly over Midland metals.

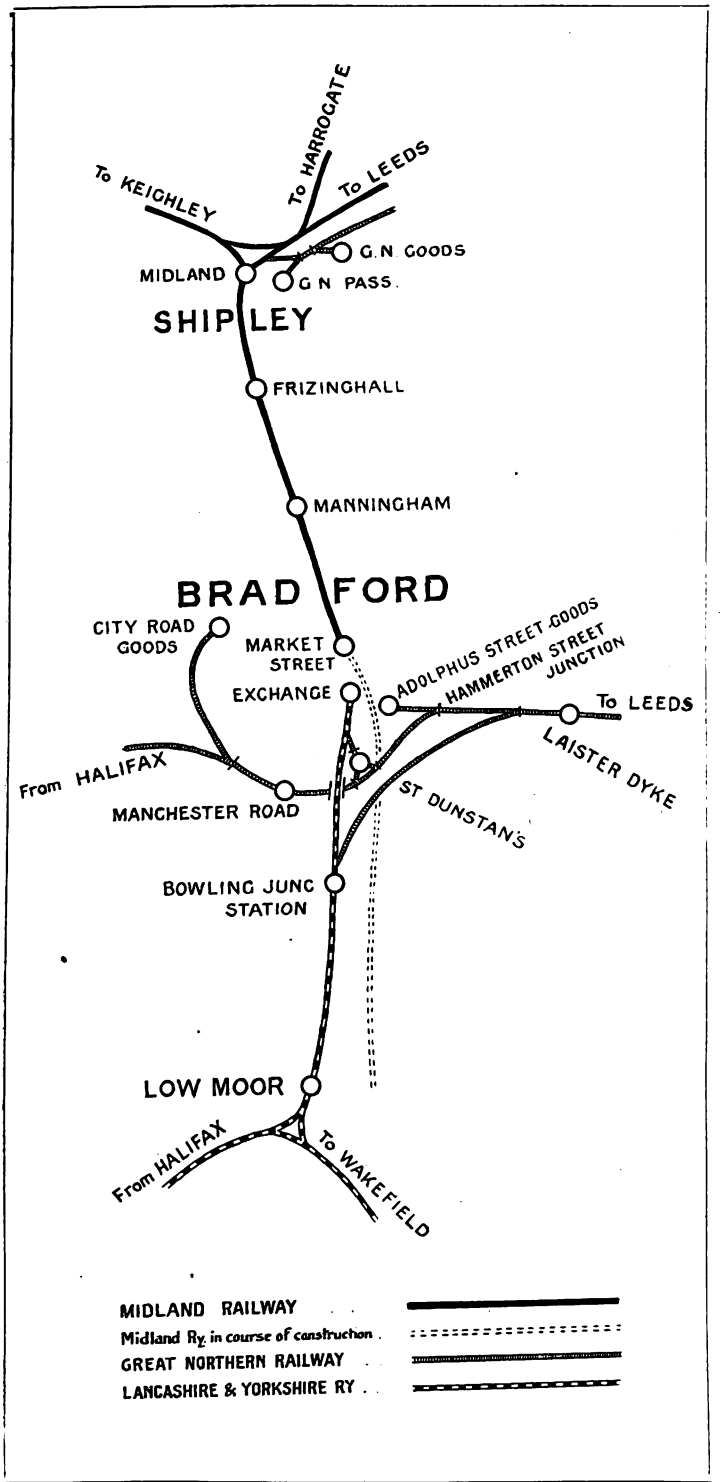
The Midland passenger terminus fronts on to Forster Square—which forms virtually the centre of the city and covers an area of 1,344 square yards—and is of pleasing design and ample proportions. Passing through the covered carriage way, the two booking halls are reached by way of entrances in the middle of the station building proper. These halls are given over respectively to the issue of first and third-class tickets; in addition provision is made in the first-class hall for the booking of passengers to Harrogate and the North Eastern line by that Company's trains. Two separate entrances are also provided away from the booking offices, one at each side. The platforms, six in number, are of the closed type, and there is invariably a general atmosphere of order and system about the terminus which speaks of sound organisation.

Considerable suburban traffic is catered for, both by Midland trains serving the residential towns of Ilkley, Grassington and Morecambe, and by the North Eastern to and from Harrogate, and (in Summer) the Yorkshire coast.

Although not at present a main-line station, there is a good service of through expresses between Bradford (Midland) and St. Pancras and other important centres. The scheme upon which the Midland Company have embarked for the construction of a new main line through the city will doubtless considerably reduce the journey time between Bradford and many of the main line stations, and result in a general speeding up of the services to and from "Worstedopolis." The scheme is of such magnitude, however, that for some little time yet Bradford folk will have to be content with the rather feeble consolation that Midland Anglo-Scottish expresses are running through Shipley—the junction for the main line, some 2 miles 69 chains away—on their journey North or South.

An alternative route to London has been opened out by the construction in 1909 of a connecting line between Royston Junction (Midland) and Thornhill (Lancashire and Yorkshire Railway), the trains employed in this service working to and from the latter Company's Bradford terminus. Adjoining the Midland passenger station is located the Company's hotel, which quite confirms the reputation which other Midland establishments of the same class have gained for comfort and good management.

Digitized by Google



MAP SHOWING THE RAILWAYS AND RAILWAY CONNECTIONS IN THE BRADFORD DISTRICT.

The Midland Railway goods depôt is situated adjacent to the passenger station on the eastern side, entrance being obtained from Canal Road. The station covers a considerable area, and in addition to the goods station itself, bonded warehouses are provided for the storage of wines and spirits under bond. The principal inward traffic dealt with is wool, and there is a heavy outgoing traffic in manufactured woollens, worsteds, silks, stuffs and iron and steel goods. Facilities are provided for the storage of wool, which arrives in large quantities during the season from London and the Humber ports, and the warehouses are at times taxed to the utmost to accommodate the huge consignments of this traffic which come to hand. Express goods trains are run between Bradford and the principal east and west coast ports, while expeditious transit is given to traffic for London and other centres.

Quite an institution in the Bradford trade is what is known as the Corporation "Conditioning House," a huge four-storey building where various tests of wool and woollen goods are carried out on behalf of the trade, and certificates issued setting out the results of the examination, supplying, as it were, a guarantee of quality. Large quantities of

Digitized by Google

goods pass between the various railway depôts and the Conditioning House. In this connection, the Midland Railway are in the somewhat enviable position of possessing the nearest goods station to the establishment, which is but a stone's throw away, thus rendering the transfer of goods possible with a minimum of cartage. The Midland Railway also has siding access to the Bradford Corporation Gas Works and the Cattle Market. At the former siding, situated between Bradford and Manningham, a considerable tonnage of mineral traffic is dealt with.

Company also using the station. At the Lancashire and Yorkshire booking office tickets are also issued to stations situated on the London and North Western Railway system. Two separate parcels offices in the rear of the station premises accommodate respectively the Great Northern and Lancashire and Yorkshire parcels staff.

There is little geographical distribution of passenger traffic at the station, and the trains of both lines make use of all the platforms. The principal passenger train services from the terminus are as follows :— Lancashire and Yorkshire with Liverpool,

EXCHANGE STATION, BRADFORD : LANCASHIRE AND YORKSHIRE AND GREAT NORTHERN RAILWAYS.

The Great Northern and Lancashire and Yorkshire Companies own what is known as the Exchange passenger station, opened in 1867. Access to the station is obtained either by way of the main approach in Bridge Street, or by a subway and staircase from the Leeds Road. Like the Midland, it is a terminal station of the closed platform type. Ten platforms are provided, and the booking offices are located in the main circulating area of the station, one for the issue of Lancashire and Yorkshire tickets, and one for the booking of passengers to the Great Northern line, that

Manchester, Southport and Blackpool; Great Northern with London and connections. During the Summer months large numbers of passengers are carried by ordinary and excursion trains between Bradford and Blackpool, while through trains to and from Bridlington and Scarborough, *viâ* Normanton and the North Eastern line, are also well patronised. On the Lancashire and Yorkshire line immediately outside Bradford two lengthy tunnels have been constructed; one at Bowling Junction, between Bradford and Low Moor, 1,648 yards long; and Wyke

Digitized by Google

tunnel, situated between Wyke and Low Moor, 1,365 yards in length.

The Great Northern Company's route to London affords the quickest run between Bradford and the metropolis by a down train which covers the 192½ miles in 3 hours 56 min. This service, the trains in which are composed of up-to-date corridor stock equipped with dining, refreshment and tea cars, is well patronised by West Riding commercial men having business in London. The Great Northern Railway possesses the shortest route to Bradford's nearest important neighbour—Leeds—the distance between the two places being only 9½ miles, as compared with the 13½ miles of line forming the Midland route between the two cities. Naturally the Great Northern has a certain advantage on this account in securing this particular short-distance passenger traffic.

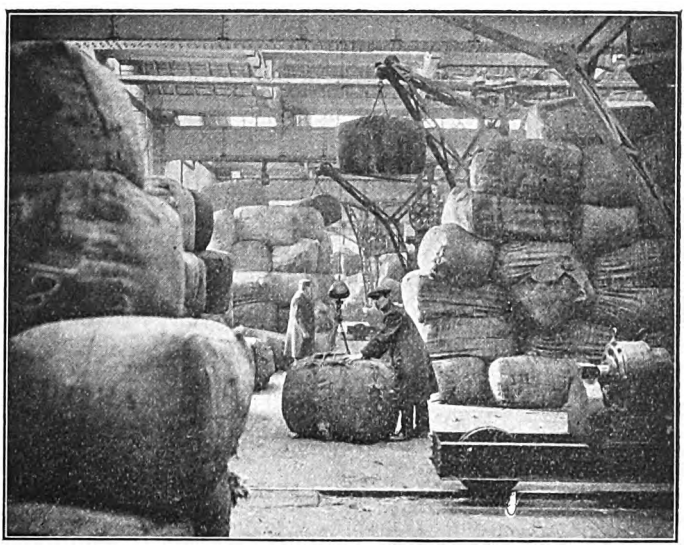
Adjoining the Exchange station, with which it is connected by means of a covered approach, is the Great Northern Victoria Hotel, which is well patronised and, with its commodious restaurant and grill room, adds considerably to the popularity of the owning company's route.

The Lancashire and Yorkshire goods stations are situated at Bridge Street, Manchester Road and Vicar Lane, and at these three depôts heavy tonnages of traffic are handled. Wool and woollens here again predominate, and considerable shipping business is conducted in connection with the sailings from the ports of Hull, Goole, Liverpool and Manchester.

The Company's large wool warehouse in Bridge Street is one of the most up to date of its kind in the country. On every floor, and even in the cellar there are electric travelling cranes of an ingenious type. These pick up a bale of wool, travel from one end of the warehouse to the other, and deposit the bale upon a lurry or wherever required. Wagons are loaded or unloaded from the lines in the warehouse, or from the sidings outside, the bales being rapidly transferred to the various floors. Judging by the vast quantities of wool stored therein, the progressive policy of the Company in erecting this fine warehouse has been amply justified. In addition to the Bridge Street warehouse, commodious cellars are provided under the sheds, and a visitor to these underground storehouses is surprised at their contents. The miscellaneous trades and large business in finished goods are accommodated in extensive sheds, equipped with over 40 hydraulic cranes.

Great Northern goods traffic is chiefly handled at that Company's Adolphus Street, City Road and Manchester Road stations, the Adolphus Street depôt—the original of which was opened so long ago as 1854—being the most important of these. A very extensive export trade is carried on from these stations to all parts of the world, *viâ* Liverpool, the north-east coast ports and London. Express goods trains connect the city with London and the great industrial centres.

In addition the Great Northern Company work traffic for the Hammerton Street and Corporation Destructor Sidings, situated between Adolphus Street station and Laisterdyke, and also for the St. James' Market Sidings. At the latter place large quantities of vegetables and other market produce for the wholesale dealers are handled, it being the most convenient goods depôt for the market. In the new potato season a heavy tonnage of traffic is received, potatoes from the Channel Islands, *viâ* Hull, considerably helping to swell the volume of inward traffic arriving.



INTERIOR OF LANCASHIRE AND YORKSHIRE WOOL WAREHOUSE AT BRADFORD.

Digitized by Google

MIDLAND RAILWAY STATION, BRADFORD.

The London and North Western Railway does not run any passenger trains into or out of Bradford, but connections with this and the Great Central lines are afforded. Goods on account of the Great Central Company are dealt with at the Adolphus Street and City Road stations, bale goods for Liverpool and the Humber ports constituting, with inward wool, the major portion of the traffic. Accommodation for London and North Western goods traffic is afforded at the Lancashire and Yorkshire stations.

One difficulty which all the railway companies serving Bradford have to contend with, arises in connection with the cartage of traffic. The city lies in a saucer-like depression surrounded by hills, and with the exception of an outlet to the north, through which the Midland line runs, whatever route is taken out of the city, road gradients of a more or less severe nature are encountered.

The Lancashire and Yorkshire Company has recently introduced motors for the delivery and collection of goods traffic, and this arrangement is working very successfully.

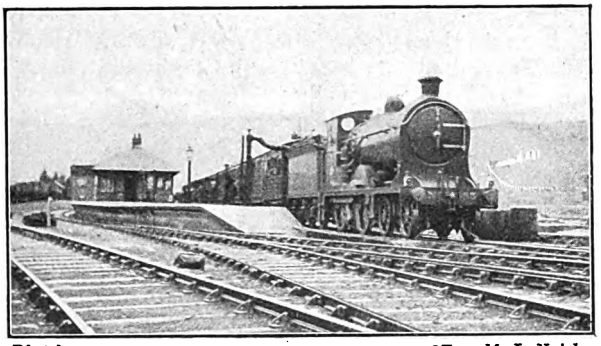
It will be readily understood that being so thick upon the ground, competition for Bradford traffic is very keen amongst the various railways serving the city, and in this connection mention should be made of the various publicity offices which have been established by the different lines. The North Eastern goods and passenger enquiry office, situated at the junction of the two main thoroughfares—Tyrrel Street and Bridge Street—is, perhaps, the most attractive of these. The window displays here shown usually take the form of goods exhibits in Winter and passenger exhibits in Summer, and are acknowledged to be most effective. Thus, in the Dutch bulb season, the windows will be one blaze of colour by reason of the numbers of many coloured blooms which make up the window space, whilst photographs and attractive reading matter in the rear, point out the advantages of the Company's daily week-day service to Holland, *viâ* Hull-Rotterdam. This railway has also an office in the Midland passenger station, in charge of an Inspector.

The Great Northern Company's city booking office is located in Market Street, while the same railway also owns a goods enquiry office in Hustlergate. The Lancashire and Yorkshire Company also are represented by a city booking and enquiry office in Market Street. The Great Western, although not running any trains into Bradford, own an office in Sunbridge Road. A corner building at the junction of Leeds Road and Drake Street, adjacent to the Exchange passenger station, accommodates the London and North Western Company's staff.

Digitized by Google

From Craigendoran to Mallaig by Rail.

By J. F. GAIRNS.



Photo] *[Tom M. L. Neish.*

GLASGOW–FORT WILLIAM AND MALLAIG TRAIN AT CRIANLARICH.

4–4–0 Locomotive No. 383.

ONE hundred and forty miles of railway, passing from end to end through magnificent mountain and loch scenery, and serving throughout a country replete with historic and tourist interest, is the unique record of the West Highland Railway. Indeed, a journey over this line is a revelation, even to one having some experience as to what Scotland has to offer in the way of scenic attractions, and when traversed as the concluding section of a continuous journey of 600 miles from King's Cross or St. Pancras creates a revival of interest which is maintained all the way from Craigendoran to Fort William, and becomes accentuated as one's tour is extended to Mallaig, the extreme northern terminus reached by North British trains. In fact, the scenery is so magnificent and impressive that a through journey engenders a suggestion of surfeit, and it is best to travel in stages, utilizing the break-of-journey facilities associated with most of the long-distance tickets issued over the West Highland Railway, to visit a few of the districts served by the line, or to take advantage of the various steamer and coach routes operating during the summer months.

The West Highland Railway commences at Craigendoran, and although worked by the North British Company, is technically a distinct system. In fact, although most of the trains run to and from Glasgow, at Craigendoran the West Highland has its own station, 17 chains beyond Craigendoran Junction, this being on a higher level than the North British station leading to Helensburgh or Craigendoran Pier, and connected therewith by means of a subway giving access to a footbridge over the platforms of the latter. The high level station is an island, and from it one obtains a splendid view over the pier station, where the railway steamers connect with the boat trains from Glasgow. A curious feature here is the signal cabin, a somewhat artistic erection, placed on the West Highland level, but also serving the lower station. This was illustrated in the RAILWAY MAGAZINE a few months ago.

Except for those which run on to the pier, North British trains continue to their terminus at Helensburgh (Lower), while West Highland trains follow a distinct route to Helensburgh (Upper) station. From Craigendoran, and, in fact, for the whole of its length, the West Highland Railway is single track, controlled by electric train-tablet apparatus. A short distance beyond Helensburgh the scenic interest of the journey commences, as the line begins to rise, following through Row and Shandon the shores of the Gareloch to Garelochhead and Whistlefield, giving magnificent views, in places from high up on the hill-side, of the loch and of the wooded hills beyond. At Whistlefield, especially as the line curves round the northern end of the loch, one has a unique view embracing almost its entire length.

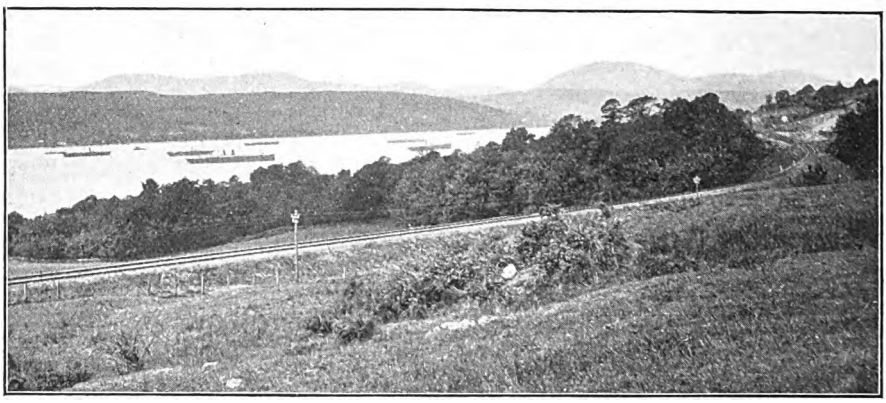
Cutting across the isthmus to the shores of Loch Long, another series of magnificent views are met with. Nine miles separate the stations at Whistlefield and Arrochar and Tarbet, but there is an intermediate semi-private station at Glen Douglas, with an island platform, and here trains can be crossed. Beyond Arrochar and Tarbet another isthmus is crossed and scenic interest is transferred to the eastern side of the line, as it follows, for the 8 miles between Arrochar and Tarbet and Ardlui stations, the banks of Loch Lomond, the most famous of all the wonderful series of

Digitized by Google

lochs in Scotland. On this stage the railway is in places built on ledges on the mountain side, curving occasionally so that if one looks ahead the impression is conveyed that the end of the line is near, and that if progress is not arrested the train must inevitably go over the brink. In fact, the numerous curves, and the location of the West Highland Railway throughout its length, frequently convey this impression, as the train climbs higher and higher along the loch shores or gradually descends before commencing another rising grade. The whole length of the railway is indeed characterised by long upward or downward grades, largely at 1 in 50 or not a great deal easier, and an almost constant succession of curves necessitating a maximum speed of about 45 miles an hour as a general rule.

So far the railway has traversed country which is systematically mountainous, passing islands, with goods yard and small engine shed adjacent, but is distinguished by the provision of a refreshment room. Here connections are made with Caledonian trains on the Callander and Oban Railway, the station for which—a very pretty two-platformed erection—is a few minutes' walk away.

Just beyond the North British station, a branch is put off towards the Callander and Oban line, used for goods transfer and special traffic, while the main line crosses the Caledonian and continues over a somewhat interesting viaduct to the other side of the valley, curving sharply at the east end of the viaduct to the north again so as to parallel the Oban line as far as Tyndrum, the two railways being visible one from the other for the whole of the intervening five miles, although separated by the valley, which is overlooked as the respective railways ascend along the hill sides.



THE GARELOCH, SHOWING WEST HIGHLAND LINE IN FOREGROUND.

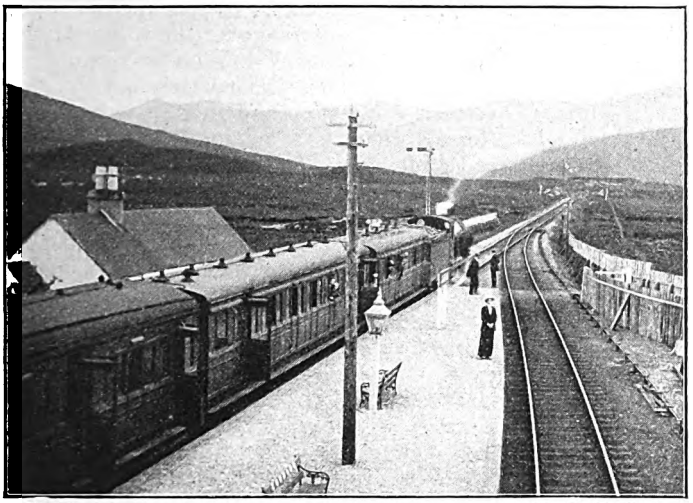
quite a number of mountains of considerable heights, but these are mostly wooded, and at Ardlui, the station for the head of Loch Lomond, this class of scenery reaches its culmination, as one views the Loch itself for miles, with Ben Lomond (3,192 ft.), Ben Arthur ("The Cobbler," 2,891 ft.), Ben Ime (3,318 ft.), Ben Varne (3,004 ft.), and Ben Vorlick (3,092 ft.), towering over the neighbouring hills, their upper portions conveying a suggestion of wildness in contrast to the tree-clad slopes of the lower levels.

Leaving the loch, the railway then follows the River Falloch for the seven miles to Crianlarich, 36¼ miles from Craigendoran, and the principal intermediate station in the journey to Fort William. Here the view is dominated by Ben More (3,843 ft.). The North British station is one of the usual

The West Highland Railway then leaves the Caledonian on the long run of 7½ miles to Bridge of Orchy, passing close to Ben Dorain (3,523 ft.). Relatively bleak and desolate but scenically interesting country is then traversed over Rannoch Moor as the second longest station-to-station distance in the United Kingdom—15 miles 48 chains—is covered to Rannoch, though this section is broken by Gortan siding, where a platform and crossing lines are provided. Ben Creachan (3,540 ft.) is passed on this stage; and at Rannoch the head of the loch of the same name is rounded, the railway running down a long grade close to the water side.

Still in wild and bleak mountainous country, with the line located in many places on ledges cut from the solid rock, the longest

Digitized by Google



Photo] [*J. B. Sherlock.*

WEST HIGHLAND TRAIN WAITING AT CORROUR FOR CROSSING PURPOSES.

section of all, 17 miles 24 chains, is traversed to Tulloch, broken, however, by a goods siding and crossing station at Corrour. There is a platform here, as at other stations of the same class, and any ordinary or express passenger train will call here at the request of Sir John Maxwell Stirling Maxwell, Bart., of Pollock, on reasonable notice being given to the nearest stationmaster or to the signalman at Corrour. In this long section may be noted Benn na Lap (3,068 ft.) and Croc Dearg (3,433 ft.), while the shores of Loch Treig are followed for several miles, and a glimpse is had of Loch Ossian.

Tulloch is the station for Loch Laggan, and connection can be made with coach services across to Kingussie. The place is a rather important centre for holiday traffic. A relatively short run of 6¾ miles to Roy Bridge, followed by 2¾ miles to Spean Bridge, and connection is made with the recently re-opened Invergarry and Fort Augustus Railway, which here diverges to the north-east, while the West Highland here turns south-west towards Fort William. Approaching the original terminus, Ben Nevis, in all its wild beauty, comes in sight, dominating even its neighbour Aenach Mor (3,999 ft.). At Mallaig Junction the extension line joins, and then we run into Fort William, the station being right on the shores of Loch Linnhe, a magnificent view of this loch, the entrance to Loch Eil, and the rising ground opposite, being obtained from the platforms.

But wonderful as is the 100 miles from Craigendoran to Fort William, the scenery is even more notable on the Mallaig extension. Leaving Fort William with a fresh engine attached at the rear, the journey is retraced to Mallaig Junction, a mile distant. The Caledonian Canal is then crossed by a swing bridge, and shortly before reaching Banavie station a branch is put off to Banavie Pier (for the Caledonian Canal steamers). Past Corpach and along through Locheilside the shores of Loch Eil are followed, in the midst of splendid scenery, but at the end of the loch, as the isthmus which separates it from Loch Shiel is crossed, is the crowning glory of the route, with Glenfinnan station as its centre.

Approaching the station, after traversing a rocky cutting and tunnel, the famous curved viaduct is traversed, with Prince Charlie's Monument in the foreground, while the larger portion of a semi-circle followed by the train brings almost the whole expanse of Loch Shiel into view. It is claimed that the further end of the loch—served by a small steamer which plies during the season—is even more beautiful; certainly a very high standard is required to excel the view presented from the train as Glenfinnan is approached and from the platform of that station.

The remainder of the route is largely a succession of rocky cuttings and ledges blasted from the mountain side to receive the rails, with ever-changing panoramas of mountain and loch scenery presented for inspection. The shores of Loch Eilt are followed for several miles, then near Loch Ailort station a fine view is given of Lochailort, open to the sea, and onwards one has the open sea visible more or less continuously on the west, with Loch Morar on the east as Morar station is approached. Between Lochailort and Arisaig stations is Beasdale platform. Any train may be ordered to call here for the purpose of picking up or setting down passengers. The person in charge at Beasdale telephones to the stationmaster at Lochailort or Arisaig when a train is required to call, but the application has to

Digitized by Google

be made in writing and signed by Mr. Nicholson, of Arisaig, Mr. Keir, Manager, or Mr. Alliston, Factor. Similar requests in writing may be handed to the Arisaig or Lochailort stationmasters, who will instruct the guard and driver of the train to call. At Mallaig and for some distance before reaching the terminus, the engineering difficulties were considerable. Mallaig itself has grown to be a fishing port of considerable importance, and it is a good centre for visiting places of interest in the neighbourhood, besides being served by steamers plying to the Hebridean islands.

The North British Railway has here a well-equipped modern hotel on the hillside. Alongside the station a branch leads on to the quay, and shunting is usually done by means of a travelling crane adapted to serve traction and lifting purposes.

The West Highland Railway was opened to Fort William and Banavie in 1894, as a development of the original scheme for a line from Helensburgh to Roshven (about 15 miles short of Mallaig) *viâ* Fort William. The extension was, however, made under a separate arrangement, with Government assistance, with the condition that a suitable pier and breakwater should also be made at Mallaig, the nearest point served by railway to several of the Hebrides. Work on the Mallaig extension was commenced in 1897 at Corpach, but the engineering difficulties were so great that the line was not opened until April 1st, 1901. The total cost of this 39¾ miles of line was about £540,000.

Between Corpach and Kinlocheil seventeen sea walls were required to protect the line. To cross the Dubh-Lighe river a double-span concrete and steel bridge is employed. For some distance beyond, the peat formation required special measures to obtain a solid foundation. Onwards to Glenfinnan a grade of 1 in 50 is entailed. The famous viaduct is 416 yards long, 100 ft. high in the centre, and consists of 21 semi-circular spans of 50 ft. each, the whole being on a 12-chain curve.

Beyond the station the gradient is again 1 in 50 for some distance. To cross the river Ailort a concrete viaduct is employed. To cross Arnabol Burn a concrete viaduct 53 ft. high with six 50 ft. spans is traversed, and the line is carried over the valley at the head of Loch-nan-Vamh on a viaduct of eight 50 ft. spans. Immediately beyond this viaduct is a section at 1 in 48, and at Coille Ropach there is a cutting 400 yards long and 60 ft. deep. At Borrodale is the longest of the dozen or so tunnels on the line, 350 yards long, and on emerging the railway is carried over Borrodale Burn by a viaduct 86 ft. high, with two spans of 20 ft. and one of 127 ft. 6 in. Morar Bridge has a span of 90 ft. In addition there are numerous other bridges, with culverts, cuttings and embankments considerably more numerous than on most railways within a corresponding distance.

In winter, trains are naturally very few on the West Highland and Mallaig Extension lines, though quite adequate; but during the season the service is considerably amplified. Through coaches with sleeping cars are conveyed from King's Cross at 7.55 p.m., and St. Pancras at 7.10 p.m. for Fort William, these being taken on during the height of the season from Waverley station at 4.25 a.m., after detachment from the Highland Railway vehicles, to Cowlairs, and thence direct to the West Highland line, running without booked stop to Arrochar and Tarbet. Thence ordinary stops are made only at Crianlarich, Rannoch, Tulloch and Spean Bridge to Fort William. The train runs on to Mallaig when required. At other periods the through carriages are attached to the 5.50 a.m. from Queen Street, Glasgow, a train which is express to Arrochar and Tarbet, and omits several stations beyond. This goes right through to Mallaig, as also the 7.15 a.m. slow train from Queen Street.

Photo] [*J. B. Sherlock.*

FORT WILLIAM STATION.

Digitized by Google

Digitized by Google

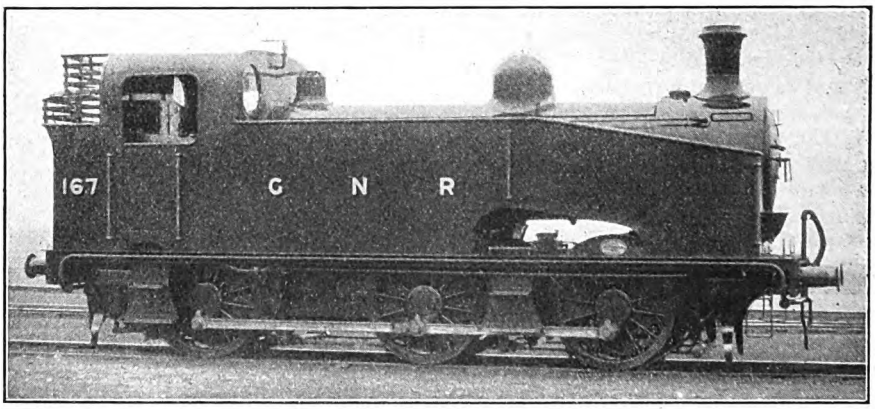
from Mallaig conveys the through vehicles returning to London. Special trains are run between Fort William and Banavie Pier as required to suit the boat connections.

New bogie rolling stock, with lavatory accommodation, side corridors, electric lighting, and otherwise equipped on essentially modern lines, is used for the principal trains, with East Coast Joint or Midland-North British carriages and sleeping cars from and to London. The new "Glen" superheater locomotives are generally employed, with a few of the previous 6 ft. or "Intermediate" class engines; 4–4–2 tank work the short distance and local trains, goods engines occasionally taking a share on the northern sections.

A large number of special circular and other tours are arranged in connection with the West Highland Railway, while tourist and excursion facilities are offered on a generous basis for long-distance travellers.

SUPERHEATER SIDE TANK LOCOMOTIVE: GREAT NORTHERN RAILWAY.

Designed by Mr. H. N. GRESLEY, Locomotive Engineer.



The engine illustrated is interesting in respect of general design, as a development, in side-tank form, of the usual 0-6-0 tank engines used in large numbers on the Great Northern Railway for shunting and local goods traffic; but it is further notable in that one of the engines has been fitted with superheating apparatus, and the others can be equipped if found desirable. The large capacity of the water tanks may be noted.

Leading dimensions are:—

Cylinders	.. .. ..	18½ in. x 26 in.	
Wheels	.. .. ..	4 ft. 8 in. diam.	
Wheelbase	.. .. ..	16 ft. 3 in.	
Length over buffers	..	33 ft. 2½ in.	
Steam pressure	.. ..	170 lbs.	
Heating surface—tubes	..	650 sq. ft.	
,, firebox	..	111·5 sq. ft.	
Heating surface—superheater		229·5 sq. ft.	
,, total	..	991 sq. ft.	
Grate area	.. .. ..	17·8 sq. ft.	
Capacity of tanks	..	1,500 galls.	
Coal capacity	.. ..	3 tons.	
Weight in working order	..	56 tons 12 cwts.	

Digitized by Google

The Railways of "Little England beyond Wales."

(No. I.)

By G. W. J. POTTER.

MAP SHOWING GREAT WESTERN RAILWAY LINES IN TENBY, PEMBROKE AND FISHGUARD DISTRICTS.

"LITTLE England beyond Wales" is the name often given to the southern portion of the county of Pembroke. There the Englishman finds himself among his own kith and kin again, and hears his own language spoken. This is a state of things which is in marked contrast to all other parts of Wales, for, with the exception of a few large towns, Welsh is still the everyday language of the Welsh people, and it is constantly heard in train and street as well as in private life.

The continued existence of an isolated English-speaking and English-loving colony for about nine hundred years is a curious and interesting fact. Its reality is apparent to all, for one has only to observe the names of the towns, villages, and geographical features, as well as the names of the people in South Pembrokeshire, and the almost entire absence of Welsh names, and the prevalence of those derived from Norse, Norman, Flemish, and English sources will be at once noticed.

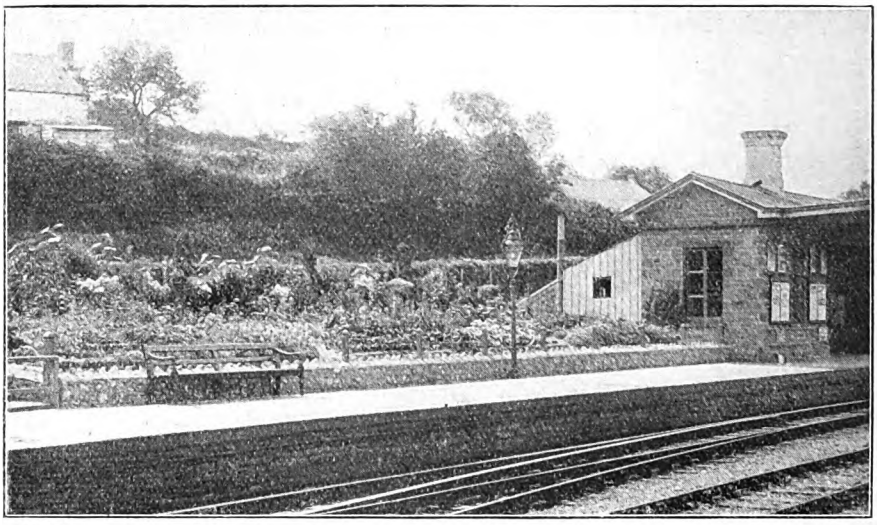
Historical authorities do not seem to be quite agreed as to the exact order of the various names by which Tenby has been known during the past centuries. Before the time of the Norman Conquest this portion of Wales was over-run with Norse and Danish pirates and adventurers, and their traces are apparent to this day. Thus there are the Scandinavian names of Hubberston, Haroldston, the islands of Skomer and Skokham, while Milford Haven is sometimes traced back to Mid fjörd Havn. Tenby would seem to be derived from Daneby or Denabi, the town of the Danes, some of whom are believed to have come to the district to participate in the excellent fishing facilities that have always characterised the seas of this part. An early Welsh name for the town was Dynbych or Dynbych y Pyscod —the little town of fish or the little fishing town.

South Pembrokeshire was conquered in 1090 by Arnulph de Montgomery. It seems probable that a Norse settlement was already established in these parts, and as the Normans and Norse were more or less akin to each other, they naturally united together in their common dislike of the Welsh. Mr. Laws, the chronicler of the district, says: "I think it is partly to this brotherhood between Norsemen and Normans that we must attribute the ease with which South Pembroke detached itself from Kymru and became Little England beyond Wales."

About a century later there was a great irruption of the sea into the low-lying districts of Flanders. Certain of the survivors came to England and petitioned Henry I. that he would give them some place in his kingdom where they might dwell. He complied with their request by sending them to Pembroke, Tenby, Haverfordwest, etc. Here they settled, and as more of their compatriots came in the next reign, an English-speaking colony was firmly established, which has survived through all vicissitudes until the present day.

Digitized by Google

In this article it is proposed to deal briefly with the railways which intersect "Little England beyond Wales," reserving those which are situated in the northern portion of the county for a future occasion. For this purpose the "English" railway will be deemed to be the two sections of the Great Western Railway extending from Whitland through Tenby to Pembroke Dock; and from the same junction point to Neyland, together with the branch to Milford. Nearly the whole of these two lines lies within English Pembrokeshire; while the Cardigan branch, the Rosebush line to Fishguard, and the more recent extension from Clarbeston Road to the same place are practically all in Welsh Pembrokeshire. This, therefore, forms a convenient mode of division.



Photo] [*D. Bowen & Son.*

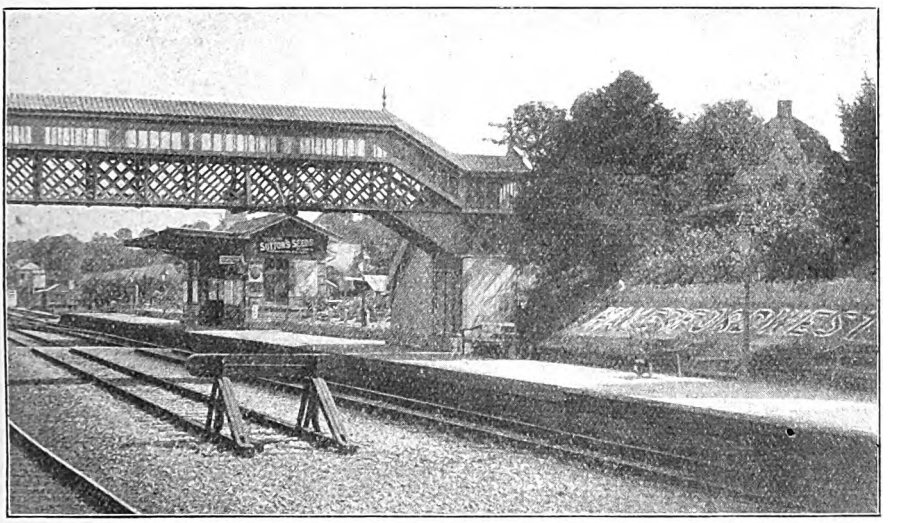
HAVERFORDWEST STATION.

The Pembroke and Tenby Railway is an example, not uncommon in the early days of British railway history, of a railway being constructed between two comparatively unimportant and isolated towns, of its limited financial success, and of its ultimate absorption by a powerful neighbour. It was on July 21st, 1859, that the Royal Assent was given to a Bill which authorised the making of a single line of railway from the town of Pembroke Dock to the famous seaside resort of Tenby, and with an extension from Pembroke Dock to Hobbs' Point on the shore of Milford Haven. The scheme was brought out under the auspices of local people, the chief of whom was a Mr. David Davies. It was not, however, the first railway which had been projected in the district, for as early as 1842 the Great Western had proposed to build a line from Whitland on the South Wales Railway to Tenby and thence to Pembroke, but this scheme was abandoned, chiefly, it would seem, through the adverse decision of a committee of shareholders. The line was duly made, and was opened throughout in 1861. The original terminus was situated in a hollow, some little distance to the west of the present station, and is now used as a coal depth. In 1864 powers were obtained to extend the line from Tenby to Whitland and thus join the South Wales Railway, by which means it was expected that traffic would be obtained from that company and through them from the Great Western. This involved the abandonment of part of the old line, and the construction of a new section on a higher level. A new station was built at the foot of Warren Street, and the line was continued over a lofty stone viaduct to Saundersfoot and thence to Whitland.

At this time the South Wales line was wholly built on the broad gauge system, and as the Pembroke and Tenby was a narrow gauge company, it naturally followed that there could be no physical connection between the two companies. Hence all passengers and all merchandise of every description had to be transferred at Whitland from one set of vehicles to another, with the inevitable result of delay in working

Digitized by Google

and much unpleasantness to all concerned. Moreover, it seems that in the days of the "Battles of the Gauges" the railway officials and servants always regarded the other side as enemies, and it would not be too much to infer that the troubles and delays were seldom minimised by the rival sides. Possibly with a view to obviate these drawbacks, but more probably with the idea in the background of getting access to the London and North Western Railway at Carmarthen, the Pembroke and Tenby board applied for and obtained powers in 1866 to extend the line to that point. This was accomplished by the construction of a connecting curve (16 chains in length) at Carmarthen, enabling them to run direct into the Town station without the other-



Photo] [*D. Bowen & Son.*

DOWN PLATFORM: HAVERFORDWEST.

wise necessary reversal at the Junction; and by running their own trains over the 14 miles of South Wales territory from Whitland to Carmarthen. For the laying of the third rail between these points the Pembroke and Tenby company paid the Great Western (the lessees of the South Wales) the sum of £20,000. On the whole, this turned out a bad bargain for the Pembroke people, for in 1872, the year following, the Great Western narrowed the whole of the track from Swindon to Milford. In 1870 the line was extended for about half a mile into the Dockyard at Pembroke under arrangements with the Admiralty. At the end of 1876 the company had 42½ miles of line in operation, and this proved to be the limit to which it reached. Its history as a separate company terminated in 1897, when it was taken over by the Great Western Railway.

Few, if any, relics of the original company are now to be seen, as everything has been modernised and brought up to the high standard of present day Great Western practice. Several of the Pembroke and Tenby officials are still in the railway service at different places. Mr. Bowen, who was the second stationmaster at Tenby, is hale and hearty and is a prominent man in the affairs of the town. He retains his interest in traffic working and may usually be seen at the station at the time when the London express is due to arrive. The present stationmaster is Mr. Fox, to whom the writer is indebted for much interesting information.

The district is now served solely by the Great Western Railway, their nearest competitor being the London and North Western Railway, who run their own trains from Craven Arms and Builth over the Central Wales line and through the Vale of Towy to Carmarthen, gaining access to the Town station by using about a mile of the Great Western's Carmarthen and Aberystwyth line.

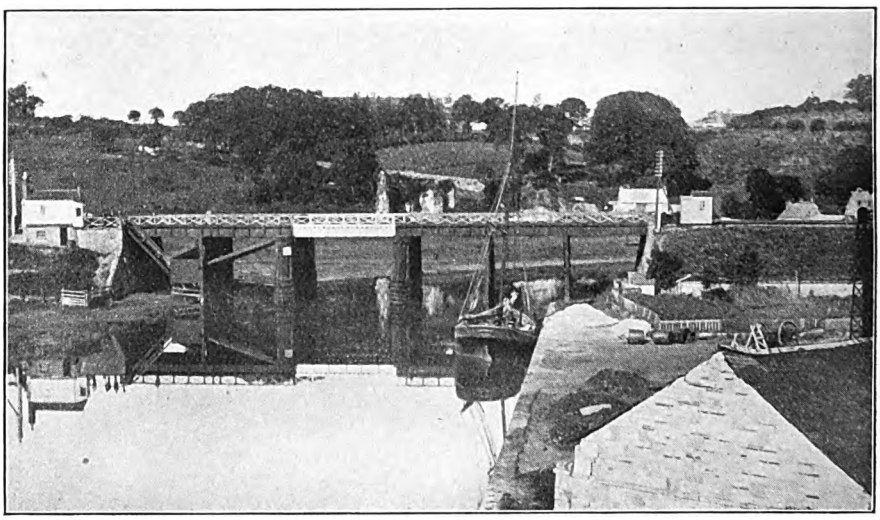
Whitland is an important station on the border of Carmarthenshire, and is the junction for the Pembroke and Tenby section, also the Cardigan branch, which leaves the main line at a point about 2¼

Digitized by Google

miles beyond the station. The accommodation provided consists of two long platforms, each having a bay at the western end for the use of the Pembroke and Cardigan services. Additions to the platforms have been made at various times, but there has been no attempt at rebuilding. An immense quantity of milk is despatched from the surrounding districts to the large towns of South Wales, and when the evening up mail arrives in the station the scene is a busy one as the cans of milk are hurriedly placed in different portions of the train, and bags of letters and parcels are put in and taken out of the large vans of the travelling post-office. In the ordinary way there is naturally a considerable amount of luggage and parcels traffic to be transferred from the main line train to the two branch line trains and *vice versa*, and as the available platform area is only small it is quite probable that a new station may be constructed at no distant date.

Leaving Whitland, it is a run of just over 5 miles to Narberth, the first station on the Tenby branch. This possesses two platforms and is a crossing-place. Just beyond is a tunnel, and thence to Templeton is a distance of 3 miles. It is here permissible to cross two goods trains, or one passenger and one goods train, but as there is only one platform two passenger trains are not allowed to cross. Next is Kilgetty, 2½ miles, then it is 1¾ miles to Saundersfoot, which is a passing-place, and Tenby is reached after a run of 3¼ miles. A clean, bright and open station with a fine view over sea and country has been erected here. Refreshment rooms are provided. The up platform is really an island, having metals on each side, but the bay is chiefly used as a goods siding and not as a running road.

Continuing the journey, Penally, 1¼ miles, is soon passed, and Manorbier, 3¼ miles, reached. This is a passing-place. Lydstep Halt to the west and Beaver's Hill Halt to the east of Manorbier are only called at during the summer season, both having been erected for the use of visitors to the various places of interest in the neighbourhood. Lamphey, the next station, is 3½ miles from Manorbier, and another mile and a half brings one to the county town of Pembroke. Here, curiously enough, there is only one platform, but a crossing loop is provided outside the station on the Tenby side, and by this means it is possible to cross the trains if desired. It is a relic of early practice, and possibly there may be other places where a similar procedure is still in force, but one cannot at the moment be called to mind.

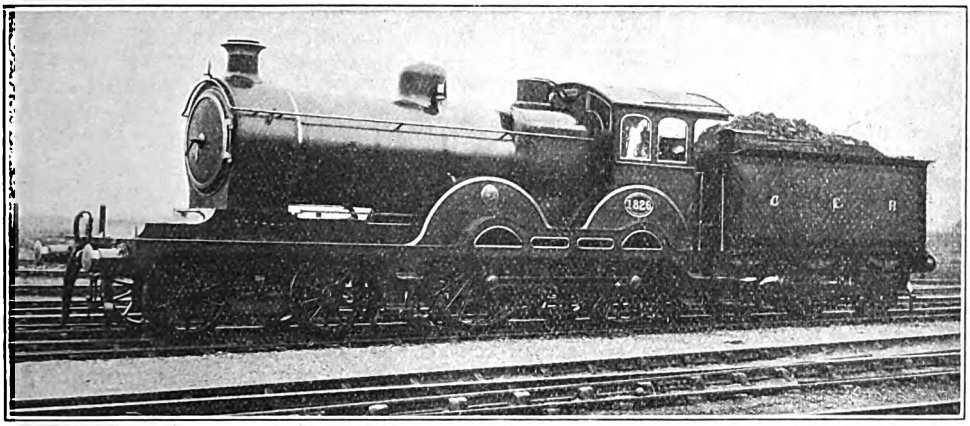


Photo] [*D. Bowen & Son.*

RAILWAY SWING BRIDGE, HAVERFORDWEST.

(*To be continued.*)

Digitized by Google



GREAT EASTERN RAILWAY 4–4–0 LOCOMOTIVE NO. 1826.

This engine worked the special trains referred to below from Liverpool Street to Aldeburgh and from Yarmouth (South Town) to London. It is distinctive in that Mr. A. J. Hill has fitted it with a "top-feed" arrangement, the feed water inlet being arranged on the side of the steam dome.

The Suffolk Coast and its Railways.

FROM the Orwell to the Yare the East Anglian Coast presents many features of special interest. Here is a beautiful shore, bordered in many places by sands which are not excelled elsewhere, with undulating cliffs most of the way, and backed by picturesque agricultural and heathland country which justifies the title of "The Garden of Suffolk," while here and there are suitably equipped holiday resorts catering for varied tastes, and coast and inland villages of historic interest, with ruined castles and abbeys and historic churches as incentives for exploring the area concerned.

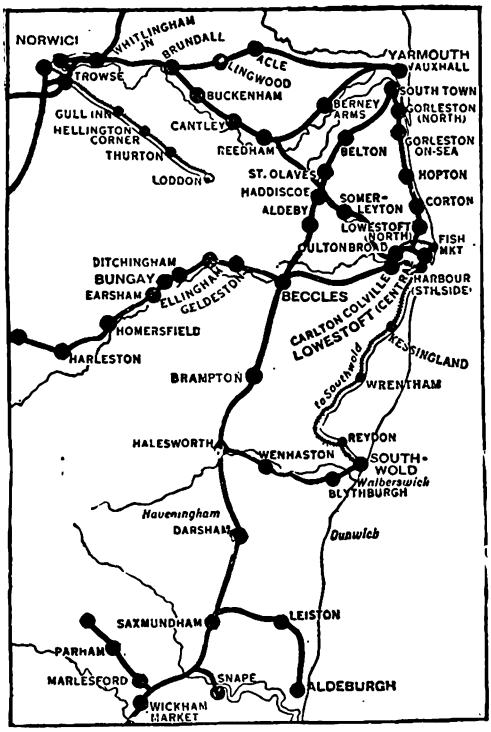
Except that Southwold is served by a short narrow gauge railway bearing its name,* and that the Midland and Great Northern Joint Railway is a party to the joint coast line between Lowestoft and Yarmouth, the whole of this area is dependent upon the Great Eastern Company for railway facilities. From Saxmundham a branch to Aldeburgh diverges, serving Leiston on the way. A few miles north is Southwold, served by its narrow gauge railway, trains connecting with the East Suffolk main line of the Great Eastern Railway at Halesworth. From Beccles the Lowestoft branch diverges, and the joint line above mentioned follows the coast through Gorleston-on-Sea to Yarmouth (South Town), while the older route *viâ* Somerleyton traverses the fringe of the Suffolk Broads.

Aldeburgh in one sense is certainly not what it was. It has more than paid tribute to the encroaching sea. Market place and cross, centre of the once busy port, are fathoms deep to-day. Of old Aldeburgh only the church and the half-timbered sixteenth century Moot Hall remain of days when it had its eight hundred fishermen.

From Aldeburgh a pleasant open road skirts the golf links, affording glimpses of the river Alde across yellow gorse ground, and continuing through leafy lanes past the old village and church of Friston. Beyond Leiston the old Norman abbey is passed, and the road continues through Theberton and Westleton, skirting glorious gorse and heather and bracken covered commons, to ancient Dunwich. It is a delightful walk from Aldeburgh to Dunwich, or all that remains on the sea-washed cliff of that once powerful Episcopal city and chief seaport on this coast. Of its prosperous quays, churches, convents, and priories,

* Described in the RAILWAY MAGAZINE, May, 1914.

Digitized by Google



MAP OF EAST SUFFOLK LINES.

nothing but a picturesque fragment is spared from the "rage and surges of the sea."

Still by commons and switchback-lanes the way lies to Southwold past the cathedral-like church and small village of Blythburgh, on the banks of the Blyth. Crossing the river, the road skirts wooded Henham Park, and by a winding way reaches Southwold.

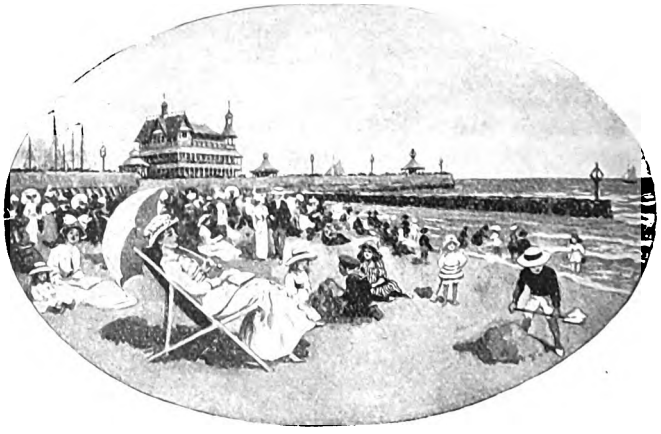
But for the lighthouse above the red roofs Southwold might be a sunny old market town. It rambles along a low cliff, with open greens and a great, handsome old Church. There is no straight and formal front. Here and there the promenade, from the sea's incursions, has become a narrow path on the battered cliff edge.

It is a few minutes' walk by beach or common, over the ferry, to Walberswick village, and then one might be in Holland, with its dykes and waterways and little wooden bridges; red roofs shining in the sun, backed by trees and topped by grey church towers; and windmills here and there. Pleasant country roads, served by motor omnibuses operated by the United Automobile Services, Ltd., run from Southwold to Lowestoft, by way of Wangford, Wrentham, and Kessingland, and also between Lowestoft and Kessingland beach.

Lowestoft, the easternmost port in England, is a combination of an industrial and fishing centre and a holiday resort. Both phases are well supported by, in the one case the Great Eastern harbour and railway facilities, and in the other by the pier owned by the railway company, and by the sands, cliffs and other attractions supplied by nature. Behind is the Broads country, with Oulton Broad near by, the River Waveney giving access to Norwich and to the general system of waterways.

From Lowestoft the road ascends and runs through Corton and Hopton following nearly the same course as the joint railway to Gorleston-on-Sea. The glory of Gorleston is its beach—a long wide stretch of sands aptly described as "soft and silky," yet firm. New Gorleston has provided its visitors with a fine 18-hole golf links, good recreation grounds for tennis, cricket and croquet, and a pavilion and bandstand.

The jetty is almost all that is left of Old Gorleston. Here, at the bracing Yare mouth, one can sit and watch the sailing craft passing in and out of Yarmouth Harbour. Behind, on the cliffs which spread away to Lowestoft, a new East Coast watering-place has sprung up, with good hotels, boarding houses, and apartments. A short run by train, electric tramway, or river steamer, gives access to Yarmouth, too well known to call for reference here.



GORLESTON-ON-SEA.

Digitized by Google

Recently, by invitation of the Great Eastern Railway, we were able to inspect this wonderful country, in company with a party of press representatives, and most of the Chief Officers of the Company, including Mr. H. W. Thornton, General Manager, Mr. P. Lomas (Secretary), Mr. F. G. Randall (Superintendent of the Line), Mr. Wm. C. May (Chief Goods Manager), Mr. H. Jones (Chief Engineer), Mr. A. J. Hill (Locomotive Superintendent), Mr. C. Busk (Continental Manager), Mr. R. B. Ellis (Assistant Superintendent of the Line), Mr. H. J. Prytherch (Chief Indoor Assistant to the Superintendent of the Line), Mr. E. A. Evans (Publicity Manager), Mr. H. A. Husbands (Restaurant Car department), several district officers, Mr. Percy Lindley, Mr. J. Hassall (the well-known poster artist), and other gentlemen. The special train was worked from Liverpool Street to Aldeburgh by No. 1826, a 4–4–0 locomotive recently fitted by Mr. Hill with a "top feed" arrangement somewhat similar to that now usual on the Great Western Railway. Slightly checked once or twice owing to the necessity for working in with other trains, Ipswich was reached in 85 min., and, after a momentary stop, the 22½ miles to Saxmundham were covered in 28½ min., including several slacks for curves, etc. Aldeburgh was reached in 2 hours 7 min. from London.

Thence motor vehicles were used for a tour *viâ* Leiston, Theberton, and Westleton to the remains of old-world Dunwich; and continued *viâ* Blythburgh to Southwold and onwards through Wangford, Wrentham and Kessingland to Lowestoft. After a halt here some of the party travelled to Gorleston-on-Sea by road, others by water, the whole constituting a tour which revealed the beauties of the country in a way which few present had previously realised.

For the return journey No. 1836 worked the special train into Yarmouth (South Town), when No. 1826 again took charge. Beccles was passed in 20½ min., and Ipswich in barely 70 min. (53 miles, with several necessary slacks). A momentary stop was made at Colchester, and the final 51¾ miles into London, with one check, occupied 61½ min.

Photo] [*Topical.*

SPECIAL TRAIN AT GORLESTON-ON-SEA STATION.

No. 1836 worked the train only into Yarmouth (South Town.)

In furtherance of the policy of encouraging the Earlier Holiday Movement the Great Eastern Railway inaugurated the excursion facilities considerably in advance of previous years. For instance, excursion bookings from London to the Provinces which hitherto during May and June have been given each fortnight, have this year been arranged weekly, and during the same period the excursion bookings from London have been changed from Thursdays to Saturday, a more popular day with the public.

Digitized by Google

On the general holiday basis there are tourist, fortnightly, week-end, short-period and local season-tickets, extra-journey and other tickets as indicated in our last number, while the fares and train services are systematically good. Thus, taking the resorts referred to only, the journey times of the principal services from London are: Aldeburgh, 99½ miles, 150 min.; Southwold, 109½ miles, 203 min.; Lowestoft, 117¾ miles, 156 min.; Yarmouth, 121¾ miles, 150 min.; Gorleston-on-Sea, 124½ miles, 159 min.

In addition to extending the excursion facilities the following important additions to the service of trains have been made.

A new breakfast car train has been run every week day since April 1st from Liverpool Street to Norwich at 8.23 a.m. giving connections to Clacton, Frinton, Walton, Yarmouth, Lowestoft, Cromer, Mundesley and Overstrand. This enables Clacton, Frinton and Walton passengers to leave Liverpool Street at 8.23 instead of 6.40 a.m. as formerly, arriving at Clacton at 10.36 instead of 10.21 a.m., accelerating the journey to Clacton 1 hour and 28 min., and to Frinton and Walton correspondingly. An additional mid-day express has been run from Liverpool Street at 1.30 p.m., every week-day, serving Clacton, Frinton, Walton, Norwich, Yarmouth, Lowestoft, Cromer, Mundesley and Overstrand, and during May and June, Sheringham. A new Restaurant Car Train on week-days from Norwich to London at 2.3 p.m., with connections from Sheringham, Mundesley, Cromer, Lowestoft, Yarmouth, Clacton, Frinton, and Walton. A new train from Clacton to Colchester at 4.35 p.m., connecting with 3.27 p.m. Express *ex*-Norwich, due Liverpool Street at 6.42 p.m., time on journey 2 hours and 7 min.

Commencing July 1st a new Luncheon Car Express will run every week-day from London to Hunstanton at 11.50 a.m., returning from Hunstanton to Liverpool Street as a Dining Car Express at 5.37 p.m. The 7.35 p.m. Restaurant Car Train from Liverpool Street to Yarmouth has a connection to Clacton, Frinton and Walton, due at Clacton 9.29 p.m., time on journey 1 hour 54 min. Last summer there was no service to Clacton, Frinton and Walton between 6.20 and 8.45 p.m.

On week-days a new train is provided from Ipswich to Colchester at 9.20 p.m., in connection with the 4 p.m. Continental Express from York and trains from Peterborough, Cambridge, Ely, Norwich, Yarmouth, Lowestoft, etc., and connecting at Colchester with the 9.58 p.m. train to Clacton, Frinton and Walton. This alteration greatly improves the connections from the North and Midlands to Clacton, Frinton and Walton, as formerly the last train from York for the Clacton Branch left at 12.57 p.m. The 12.3 Saturday night Supper Car Train from Liverpool Street to Clacton will also have a new connection at Thorpe for Frinton and Walton.

A number of the express seaside trains have restaurant car accommodation, and special arrangements are made for children, so that, in combination with luggage-in-advance and other facilities, the requirements of family parties are met as well as those of business men and women: week-enders, tourists, golfers, anglers, yachtsmen and others.

Digitized by Google

Mr. George Morris Bosworth, Vice-President, Canadian Pacific Railway.

MR. G. M. BOSWORTH.

It is, of course, only natural that a corporation like the Canadian Pacific Railway, with world-wide activities and interests, requires men of the highest possible integrity to guide its affairs. Moreover, in the service of such a Company the best men are bound to rise up to the highest positions because there is every opportunity for a capable man to prove his worth. In Mr. George M. Bosworth, one of the Vice-Presidents of the Canadian Pacific Railway, we have a living example of the way in which, by merit and industry, a man may rise from the ranks to an important official position in the service of the greatest corporation within the British Empire.

Mr. Bosworth was born at Ogdensburg, New York, in the year 1858, and, like many other great transportation officials, has been connected with railways and shipping from his earliest years. In 1875 he entered the service of the Ogdensburg and Lake Champlain Railroad, in the comparatively short space of six years obtaining appointment as General Freight Agent to the Company. He then left the Ogdensburg Railroad to join the National Despatch Line of Chicago as Travelling Freight Agent, remaining in this post but a short while. In 1882 he commenced what has proved to be his life work, by beginning as Assistant General Freight Agent for the Eastern Lines of the Canadian Pacific Railway, when the line was practically in its infancy. The railway tratfic increased rapidly with the development of Canada, which followedimmediately on completion of the line from Atlantic to Pacific, and before many more years had elapsed Mr. Bosworth was appointed General Freight Agent for the Eastern Division. Canadian Pacific enterprise proceeded apace, steamship services under its management were commenced, on the Pacific from Vancouver to China and Japan, afterwards from European ports to Canada, affording in that way a direct connection almost half round the world, which brought a gigantic increase in traffic, requiring the hand of an expert to guide and control the immense volume of freight passing over the system. Mr. Bosworth was the expert who eventually took control of this branch of the company's activities, being appointed Freight Traffic Manager for the whole system. A yet wider field was given to Mr. Bosworth by his appointment as Fourth Vice-President to his company in the year 1901, in

Digitized by Google

which exalted position he proved his great administrative capacity, for the Canadian Pacific has extended its activities over such a wide area and in so many directions as to require men at the head of affairs who can deal with widely varied and difficult questions. Since the year 1910 Mr. Bosworth has held a yet higher appointment with the company as a Vice-President, and he is one of Sir Thomas Shaughnessy's right-hand men.

Mr. Bosworth's activities do not end with his official duties to the Canadian Pacific Railway. He is a Director of the American Marconi Wireless Telegraphy Company, the Dominion Dry Dock Company, the Crown Trust Company, La Banque Provinciale, as well as Vice-President of the Canada Club, Montreal. In social life Mr. Bosworth displays a similar diversity of interest; he is a member of all the leading clubs in and around Montreal, among them being the Montreal Hunt Club, Jockey, the Royal St. Lawrence Yacht Club, and the Canadian Camp Club.

Railway Literature.

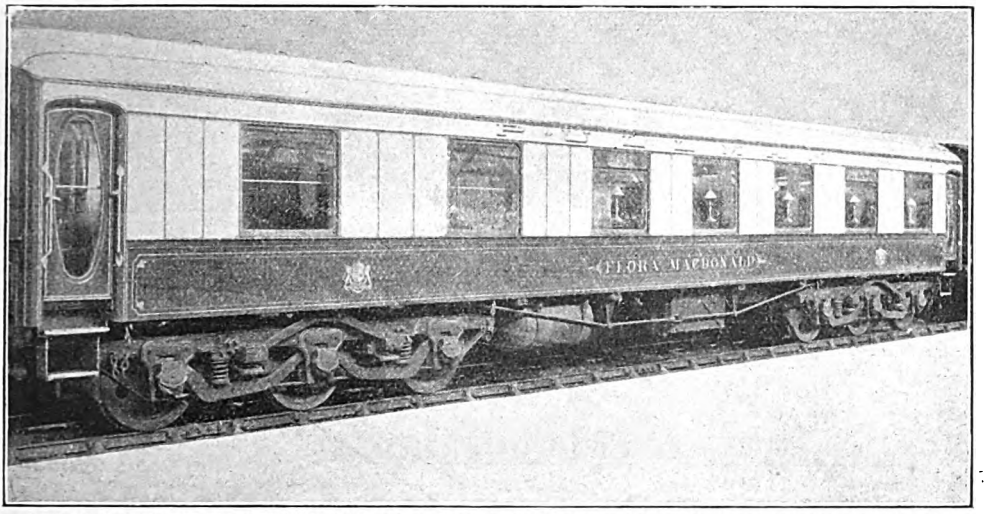
THE SURVEY GAZETTEER OF THE BRITISH ISLES. Edited by J. G. Bartholomew, LL.D. [Price 15s. net. Strongly bound in buckram.] Changes and developments in the topography of the country during the past ten years have necessitated an entirely new edition of the *Survey Gazetteer*, so that the 1914 edition is to a great extent a new work, remodelled and rewritten, and containing no less than 12,000 additional entries. The new edition consists of about 800 pages, and contains notices of about 82,000 place-names, and over 12,000 seats, shooting lodges, and mansion houses. Also names of deer forests, fishing lochs and streams, and grouse moors throughout the country. The latest census figures, even of the smallest villages, are given in every case. Whilst the scope of the new volume has been considerably enlarged, its bulk has at the same time been reduced. This has been achieved, not by the sacrifice of anything that would impair its value as a standard work of topographical reference, but by the condensation of the longer articles, together with the use of smaller type and special paper. The appendix contains a glossary dealing with the etymology of British place-names, also tables of comparative statistics relating to demography, agriculture, climate, etc., whilst a complete atlas of the British Isles, reduced from the ordance Survey to a uniform scale of 10 miles to an inch, and beautifully printed in colours, has been added as a useful supplement. Copies can be had at the offices of the RAILWAY MAGAZINE, 30, Fetter Lane, London, E.C. at published price.

RAILWAY WONDERS OF THE WORLD. By Frederick A. Talbot. First issued in fortnightly parts, and already reviewed in the RAILWAY MAGAZINE, this interesting work is now being published by the Waverley Book Co. Ltd., 7, 8 and 9, Old Bailey, London E.C., on special terms, particulars of which are given in the advertising pages attached to this number. Mr. Talbot has collected a great deal of valuable information concerning remarkable railways and railway works in all parts of the world, while the selection of colour plates and half-tone illustrations renders the volumes particularly acceptable for library and presentation purposes, as well as for reference. The work has been revised and includes twelve folding plates which did not appear in the serial parts.

* * *

RAILWAY OPERATION: THE PASSENGER STATION AND SIGNALLING. [By John A. Jenkinson, David R. Lamb and Charles Travis. Price 1s.] This is a useful little book by the authors of "The Elements of Railway Operating Economics." Early chapters deal with the booking office, luggage, parcels, works accounts, carriage by passenger train, and coaching accounts. Then follow sections devoted to signalling, and station supervision and management. The volume will be of considerable use to younger railway officers, while men of mature experience will also find something instructive and useful within its pages. Copies can be obtained from the offices of the RAILWAY MAGAZINE at published prices, postage 3d. extra.

Digitized by Google



PULLMAN DINING CAR USED ON GLASGOW AND NORTH SERVICE, CALEDONIAN RAILWAY.

Summer Train Services.

In accordance with our practice for many years past, we present our annual review of the principal train alterations and developments which characterise the summer arrangements on various railways. All important alterations are set forth below, and we have to acknowledge the courteous co-operation of the chief officers of the railways concerned in enabling us to prepare this review, at the relatively early date when it has to be compiled. It must be remembered that all these are additional to developments introduced in earlier years; so that while certain lines, such as the Lancashire and Yorkshire Railway, have nothing special to record, it is mainly because they have already done so much in the past that further improvements are not yet called for.

CALEDONIAN RAILWAY.

New arrangements on this line are relatively voluminous, and for particulars of developments already in force readers may be referred to pages 429 and 430 of the May RAILWAY MAGAZINE, many facilities having been brought into force in May and June.

The most important feature is the inauguration of Pullman cars on a large number of express services. As previously indicated, 17 cars will be utilised on the various services: four dining cars, twelve buffet cars, and one observation car. The dining cars will be used on the express services between Glasgow (Buchanan Street), Perth and Aberdeen, and they are now running on the following trains: From Glasgow (Buchanan Street) at 7.30 a.m., 10 a.m. and 5 p.m.; from Aberdeen at 10.5 a.m. (10.35 a.m. from July 1st), 1.10 p.m. (12.50 p.m. from July 1st) and 5.30 p.m. The buffet cars are now also running on the more important express trains between Glasgow (Central) and Edinburgh (Princes Street). Cars will also be used on the main line services, including a buffet car on the "Tinto" residential express between Glasgow (Central) and Moffat, and on the "Strathearn" residential express between Glasgow (Buchanan Street) and Crieff. The observation car is to be run between Glasgow (Buchanan Street) and Oban.

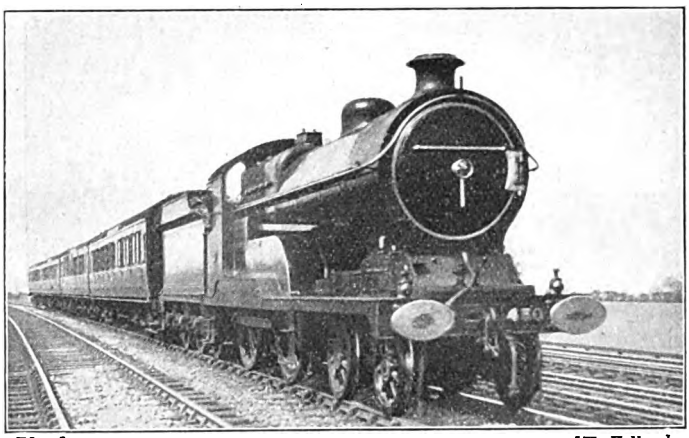
As regards new train services, from July 1st an important acceleration will be made in the through service between Glasgow (Central) and Newcastle *viâ* Carlisle. The 10 a.m. express from Glasgow (Central) to Carlisle will have an express connection from the latter point to Newcastle, arriving there at 1.45 p.m. This is an acceleration on the service hitherto provided of 65 min., and gives the fastest service between Glasgow and Newcastle. Improvements are being effected in the Glasgow (Central) and Newcastle service generally, and a new train is also being run from Newcastle at 11.20 a.m., reaching Glasgow at 4.20 p.m. So far as the through services to England are concerned, there is little change to record.

A new Sunday train service has also been introduced from June 1st between Glasgow (Central) and Edinburgh (Princes Street) particularly for the purpose of serving the local districts situated between the two cities.

CAMBRIAN RAILWAYS.

The Cambrian Railways summer service will operate from July 12th, and accelerated services will be afforded between the industrial centres and the Cardigan Bay resorts, and Wells of Mid-Wales. Express trains with through corridor coaches will be run from the principal centres, to Aberystwyth, Barmouth and Pwllheli, and in order to expedite the working of the tourist expresses, and with a view to avoiding delay thereto, the company are putting on a few local trains. A new crossing station will be opened

Digitized by Google



Photo] [*H. Kelland.*

GREAT CENTRAL RAILWAY: UP MANCHESTER EXPRESS.
4-4-0 locomotive No. 430 *Purdon Viccars.*

at Clatter, dividing the present long section between Caersws and Carno. This will be of material advantage in the working of the trains, and prevent delays which have hitherto occurred at either end of this long section, waiting for trains to clear.

DUBLIN AND SOUTH EASTERN RAILWAY.

Commencing June 1st, the 10.15 a.m. train from Harcourt Street to Wexford was altered to leave Harcourt Street at 9.25 a.m., and to run correspondingly earlier throughout, with connections to Shillelagh and Waterford. A new tourist train is now provided from Dublin (Harcourt Street) at 10.15 a.m., with a connection from Westland Row and stations on the Kingstown line, and runs direct to Shillelagh, stopping at Bray and all stations between Bray and Shillelagh. Combined rail and car tickets at very low fares are issued to passengers travelling by this train, and cars are in readiness on arrival at Bray station for drives to Powerscourt Waterfall, the Scalp, Enniskerry and Glen of the Downs. Similar tickets are issued to passengers by both the 9.25 a.m. and 10.15 a.m. trains to Rathnew and Rathdrum stations for car drives to the Devil's Glen and Glendalough; to Avoca and Woodenbridge stations for drives to the Meeting of the Waters, Castle Howard, Glenart, Shelton Abbey, and other beautiful scenery in the neighbourhood of these stations. The return tourist train leaves Shillelagh at 3.20 p.m., and is due in Dublin at 6.8 p.m.

FURNESS RAILWAY.

The arrangements adopted for the last few summers will be practically repeated, commencing July 1st; and in addition a considerable improvement will be made in the morning service to the South. Commencing July 13th, a new train will leave Whitehaven at 8.53 a.m., calling at principal stations, with connection from the Windermere branch and arriving at Carnforth at 11.35 a.m. The train will be in connection at Whitehaven with the 6.40 a.m. from Carlisle, and at Carnforth with the London and North Western express due to arrive at Euston at 5.7 p.m. This train will accelerate the service from the Furness line by nearly an hour.

GLASGOW AND SOUTH WESTERN RAILWAY.

In June the standard services were considerably amplified to meet the needs of early visitors to the south-western counties of Scotland and the Clyde resorts. During July, August and September new daily trains will run from Stranraer to Glasgow at 12.50 p.m. and from Glasgow to Stranraer at 4.10 p.m., giving connections from and to Belfast and places in Ireland *viâ* Larne, the "Short Sea Route." Another new feature is an excursion steamer between Princes Pier, Greenock and Ayr *viâ* Rothesay and Largs daily except Saturdays, in connection with which a circular tour has been arranged enabling passengers who desire to do so to return by train from Ayr to Glasgow or proceed from Glasgow to Ayr by train and return by steamer. The steamboat services *viâ* Princes Pier with Dunoon, Rothesay, Kyles of Bute, Inveraray, Ardrishaig and Arran (east side) and other resorts in the upper reaches of the Firth; *viâ* Fairlie with Millport, Kilchattan Bay, Arran (west side) and Campbeltown; and *viâ* Ardrossan with Arran; also from Ardrossan, Troon and Ayr are now in full operation. The Isle of Man service *viâ* Ardrossan commenced on June 22nd, and the Portrush service on June 26th.

GREAT CENTRAL RAILWAY.

In connection with the Earlier Holidays Movement the Great Central Railway commenced in June to run a tourist express on Mondays, Thursdays and Saturdays from Leicester at 7.30 a.m., Loughborough 7.46 a.m., and Nottingham at 8.13 a.m. to Grimsby and Cleethorpes, *viâ* Lincoln; the return train leaving Cleethorpes at 7.20 p.m., and from July 1st the service will be run daily. On Mondays and Saturdays during June, and each week-day from July 1st until September 19th a tourist express leaves Sheffield at 8.35 a.m for Mablethorpe and Skegness; returning from Skegness at 6.10 p.m. and Mablethorpe 5.55 p.m. The full summer service will be brought into operation on Monday, July 13th, when the following through trains will commence to run:—(1) Restaurant Corridor Express from

Digitized by Google

Liverpool (Central) at 11.10 a.m., Warrington 11.38 a.m., Stockport (Tiviot Dale) 12.7 p.m., Manchester (London Road) 12.0 noon and Sheffield at 1.21 p.m. for Yarmouth and Lowestoft. The return train leaves Lowestoft at 12.0 noon and Yarmouth at 12.12 p.m. (2) Tourist Express for Aberystwyth and the Cambrian Line from Sheffield (Victoria) at 9.5 a.m. and Manchester (Central) at 10.50 a.m. In the reverse direction a train leaves Aberystwyth for Manchester and Sheffield at 12.25 p.m. (3) On Mondays, Tuesdays, Fridays and Saturdays a tourist express leaves Leicester at 8.5 a.m., Nottingham 8.42 a.m. and Sheffield at 10.5 a.m. for Blackpool, returning from Blackpool (Talbot Road) at 2.7 p.m. (4) Through Express from Sheffield (Victoria) to Liverpool, leaving at 7.30 a.m. on Mondays, Tuesdays and Saturdays, connecting with the steamers to Douglas and Llandudno. The return train leaves Liverpool (Central) at 8.33 p.m., after the arrival of the North Wales and Isle of Man Steamers. (5) The 8.20 a.m. Breakfast and Luncheon Car Express from Manchester to Bristol will be extended to Taunton, with through carriages to Ilfracombe. The return train leaves Ilfracombe at 12.10 p.m., Taunton 3.5 p.m. and Bristol 4.7 p.m. (6) Through Corridor Breakfast, Luncheon and Tea train from Newcastle at 7.52 a.m., York at 10.23 a.m. for Nottingham, Leicester, Rugby, Oxford, Winchester, Southampton, and travellers to the Isle of Wight are provided with a through service *viâ* Lymington from the Great Central System. A similar train will leave Bournemouth at 11.20 a.m. with direct communication from the Isle of Wight, arriving York 7.37 p.m. and Newcastle 10.16 p.m.

GREAT EASTERN RAILWAY.

To a great extent the Great Eastern Railway summer arrangements are covered by references appearing in another article in this issue of the RAILWAY MAGAZINE. It is therefore unnecessary to deal at length therewith again, especially as some of them were introduced earlier in the year, and it will be sufficient to present a brief summary for completeness:—

(1) Breakfast car expresses from Liverpool Street at 8.23 a.m. for Norwich, with connections to Clacton, Frinton, Walton, Yarmouth, Lowestoft, Cromer, Mundesley and Overstrand.

(2) Mid-day express from Liverpool Street at 1.30 p.m., serving Clacton, Frinton, Walton, Norwich, Yarmouth, Lowestoft, Cromer, Mundesley and Overstrand.

(3) Restaurant car train from Norwich to London at 2.3 p.m., with connections from Sheringham, Mundesley, Cromer, Lowestoft, Yarmouth, Clacton, Frinton and Walton.

(4) A new train from Clacton to Colchester at 4.35 p.m., connecting with 3.27 p.m. express *ex*-Norwich, due Liverpool Street at 6.42 p.m.

(5) Commencing July 1st, luncheon car express from London to Hunstanton at 11.50 a.m., returning from Hunstanton to Liverpool Street as dining car express at 5.37 p.m.

(6) The 7.35 p.m. restaurant car train from Liverpool Street to Yarmouth will have a connection to Clacton, Frinton and Walton, due at Clacton 9.29 p.m. Last summer there was no train from Liverpool Street to Clacton, Frinton and Walton between 6.20 and 8.45 p.m.

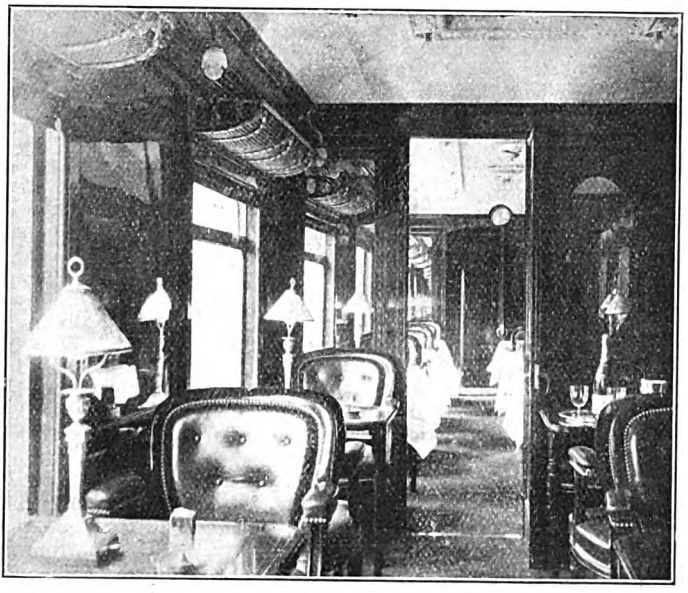
(7) A new train from Ipswich to Colchester, at 9.20 p.m., in connection with the 4 p.m. Continental express from York and trains from Peterborough, Cambridge, Ely, Norwich, Yarmouth, Lowestoft, etc., and connecting at Colchester with the 9.58 p.m. train to Clacton, Frinton and Walton.

(8) The 12.3 Saturday night supper car train from Liverpool Street to Clacton will also have a connection at Thorpe for Frinton and Walton.

(9) Early morning express from Liverpool Street at 5.12 a.m. for Southend, due 6.20 a.m. All the usual facilities are, of course, repeated.

GREAT NORTHERN RAILWAY.

The principal developments on this railway relate to the services between provincial trains and the Lincolnshire coast. A new through



INTERIOR OF PULLMAN DINING CAR USED ON GLASGOW AND NORTH SERVICE, CALEDONIAN RAILWAY.

Digitized by Google

express between Manchester (Central) and Skegness and Mablethorpe, *viâ* Retford, Lincoln and the new Kirkstead and Little Steeping line will run each Friday and Saturday from July 3rd to September 12th inclusive. The outward train will leave Manchester (Central) at 11 a.m., calling at Stockport, Sheffield, Worksop, Retford and Lincoln, arriving Skegness at 3.4 p.m. and Mablethorpe 3.23 p.m. The return train will leave Mablethorpe 5.55 p.m. and Skegness 6.10 p.m., and be due to arrive Manchester (Central) 10.9 p.m. Through carriages for Sutton-on-Sea and Mablethorpe will be conveyed each week-day by the 8.35 a.m. Sheffield to Skegness express, arriving Mablethorpe 11.30 a.m. and returning from Mablethorpe 5.55 p.m., arriving Sheffield 8.53 p.m. Through carriages from Leeds to Skegness (*viâ* Lincoln) by the 7.3 a.m. train *ex*-Leeds will run from July 3rd to September 12th inclusive, Tuesdays and Wednesdays excepted. An additional through train will leave Shirebrook at 7 a.m. for Skegness, returning from Skegness 6.40 p.m. each Saturday from July 4th to September 9th inclusive. All passenger trains will be extended from Dunstable (Church Street) to Dunstable (London and North Western station) on Sundays.

GREAT WESTERN RAILWAY.

In many respects the summer arrangements on this line present features of peculiar interest. The "Devon and Cornwall Special" third-class tourist train will be reinstated, leaving Paddington at 9.30 a.m. every Friday and Saturday commencing July 24th, and returning every Monday and Saturday, commencing July 25th. As last year it will be booked non-stop between London and Newton Abbot. It has been anticipated for some time that the "Cornish Riviera" Limited Express would be added to the Sunday service, and for the benefit of travellers and tourists unable to leave town on Saturdays "this popular *express de luxe*" will run on Sundays during the holiday period, leaving Paddington at 10.30 a.m. and calling first at Exeter, serving Dawlish, Teignmouth, Newton Abbot, Torquay, Paignton, Plymouth, Truro, Falmouth, Helston, St. Ives and Penzance (due 5.15 p.m). A new restaurant car train will also be inaugurated on Sundays, leaving Penzance at 12.15 p.m. and reaching Paddington at 7.50 p.m. On Sundays August 2nd, 9th, 16th and 23rd a new service from Guernsey will be given at 10 a.m., due at Paddington at 7.50 p.m.

The 1.0 p.m. train from Paddington will be extended, and its connections amplified. New and accelerated services between Liverpool, Birkenhead and Birmingham will be provided. The 8.45 p.m. Irish Boat Express from Paddington to Fishguard Harbour will start at 8.30 p.m., and be correspondingly earlier throughout.

HIGHLAND RAILWAY.

Summer arrangements apply mainly to the Strathpeffer services, as referred to recently. The full train service begins in July, but a special express has been run every Tuesday in June in connection with the morning trains from Edinburgh, Glasgow and Dundee, as previously noted. Commencing July 1st a through sleeping car will be run from London (King's Cross) to Strathpeffer by the train which leaves at 7.55 p.m. every night except Saturday.

ISLE OF WIGHT RAILWAYS.

As mentioned in our last issue, an arrangement has been made between the Isle of Wight Central, and Freshwater, Newport and Yarmouth Railways for the through working of the latter company's trains into and out of the Isle of Wight Central station at Newport. Following the lead of the Isle of Wight Central, the Isle of Wight Railway issues third-class penny-a-mile tickets by all trains between all stations. The Island Railway Companies brought their summer service into force on and from June 1st this year instead of July 1st as hitherto.

The Isle of Wight Central Railway have arranged new trains at 6.45 a.m. from Newport to Cowes, connecting with the 7.15 a.m. steamer from Cowes to Southampton, and at 7.10 a.m. from Cowes to Newport, connecting with the 7.25 a.m. train from Newport to Ryde Pier Head, Portsmouth and London.

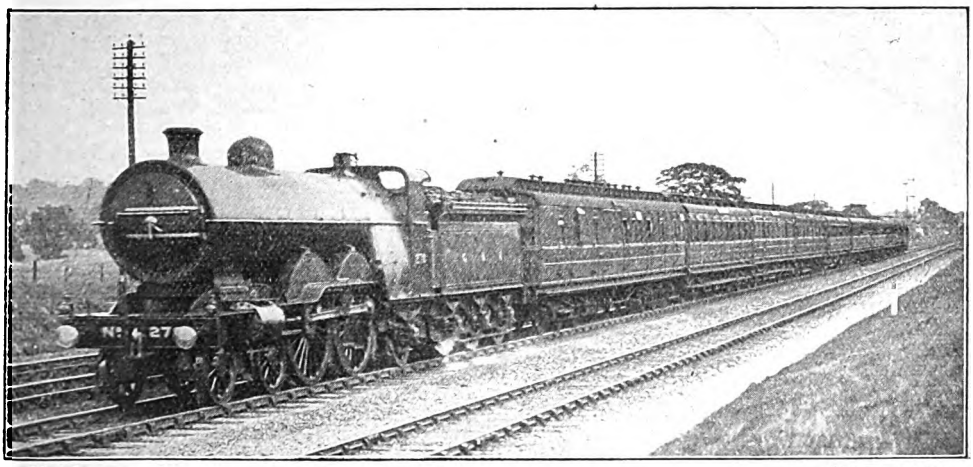
LONDON AND NORTH WESTERN RAILWAY.

On the whole there are no great changes to record, but several items of interest may be noted. Instead of the 10.40 a.m. train from Euston, with through vehicles from Cambridge to Llandudno and Luncheon car from Euston to Crewe, a train will leave Willesden Junction at 10.45 a.m., with connections from Broad Street and Addison Road, with luncheon car to Crewe and through vehicles to Llandudno, taking substantially the same schedule down the line as last year's train. The morning "City to City" express to Broad Street is retained, but instead of the down service a new two-hour express will leave Euston at 5.50 p.m., and slip vehicles at Coventry. The 5.55 p.m. Liverpool express will leave at 6.0 p.m. the Manchester train at 6.10 p.m. with, however, corresponding schedules to those hitherto in force. The 7.30 p.m. Greenore boat express will be reinstated. On Sundays the 12 noon train is divided, the Manchester and East Lancashire vehicles leaving at the old time, and the Liverpool section following at 12.15 p.m., with the Birmingham train at 12.45 p.m. Various other alterations and improvements will also be included. Until September 12th a through express service will be given by the 10 a.m. from Newcastle-on-Tyne to Llandudno and the North Wales Coast, returning from Llandudno at 2.35 p.m. The summer time-tables will apply from July 12th to September 30th.

Digitized by Google

LONDON AND SOUTH WESTERN RAILWAY.

In accordance with the practice of several recent years, the summer train services are brought into force early, in this case on June 7th. All usual features will be reinstated, and among the numerous additional facilities the following may be specially noted. In July last summer's 12.50 p.m. from Waterloo to East and North Devon will this year start at 12 noon and run from July 17th to September 19th inclusive, conveying passengers for East Devon and Exeter only. A new supper car train will leave Waterloo at 10.30 p.m. for Southampton, conveying passengers for Havre, Paris and the Channel Islands in place of last summer's 9.45 p.m. train. This will improve the service by 45 min. From July 17th to September 19th a new express will leave Exeter at 5.28 p.m. for Torrington and Ilfracombe, in connection with the 1 p.m. train from Waterloo, arriving



Photo] [*F. E. Mackay.*

GREAT NORTHERN RAILWAY: 2.20 P.M. ANGLO-SCOTTISH EXPRESS.
4-4-2 locomotive No. 278.

Torrington at 7.14 and Ilfracombe at 7.34 p.m. Passengers for the daylight service to Paris on Saturdays, July 25th to September 12th inclusive, will be conveyed to Southampton by a new train from Waterloo at 9.30 a.m. in place of last summer's 8.45 a.m. service. Passengers for the daylight service to the Channel Islands on Saturdays, August 1st, 8th, 15th and 22nd, will also be conveyed by this train.

In the suburban area several new trains are added, materially amplifying both week-day and Sunday facilities.

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

The principal feature of the summer service of the London, Brighton and South Coast Railway is the opening of the Ashurst spur line, connecting the main London and Tunbridge Wells lines with the Crowborough and Heathfield branch lines. This enables trains to be run direct between London, Crowborough, Uckfield, Heathfield, etc., and obviates the change at Groombridge. On and from June 7th, therefore, the service is increased and greatly accelerated. The essential improvements to Crowborough, Uckfield, etc., will be additional through trains to Crowborough on week-days from Victoria 9.10 a.m., 2.35 p.m. (Saturdays only), 4.50 p.m., 5.50 p.m. (Saturdays only), 6.3 p.m. (not Saturdays), and 8.5 p.m. From London Bridge 12.25 p.m., 1.38 p.m., 4.45 p.m. (not Saturdays) and 7 p.m. (not Saturdays). On Saturdays only a new service will leave Victoria at 9.5 p.m., arriving at Crowborough at 10.25 p.m. On Sundays from Victoria 8.50 a.m. These alterations shorten the time on journey from 7 to 34 min. The present week-day trains at 11.10 a.m. from Victoria and 3.45 p.m. from Victoria are accelerated to Crowborough by 13 min. and 7 min. respectively. On the up journey the 8.10 a.m., 11.9 a.m., 3.25 p.m. and 5 p.m. from Crowborough are now through trains to London, reducing the time from 10 min. to 21 min. Other trains are also improved and accelerated. A new through service leaves Crowborough at 6.1 p.m., arriving at Victoria at 7.15 p.m. On Sundays new trains now run from Crowborough at 8.18 a.m. and 8.16 p.m., arriving at Victoria at 10.20 a.m. and 9.47 p.m. respectively.

The Brighton, Hove and Worthing train service also shows many improvements. On Sundays the 10.45 a.m. Eastbourne "Pullman Limited" from Victoria now leaves at 10.40 a.m., and has a Worthing portion attached, due to arrive at Worthing at 12.8 p.m. This replaces the 11.15 a.m. from Victoria, and expedites the journey by 17 min.

The Eastbourne services have also been improved. A new train on week-days leaves Eastbourne at 4.20 p.m. and arrives at London

Digitized by Google

Bridge at 6.13 p.m. The 12.5 midnight train, Victoria to Eastbourne, on Wednesdays and Saturdays only, is extended to Bexhill. A new train leaves Lewes for Seaford at 7.15 p.m. in connection with the 5.56 p.m. from London Bridge, accelerating the service to Seaford by 33 min. Pullman Buffet parlour cars are now attached to the 11.35 a.m. from Victoria and 4.50 p.m. from London Bridge to Portsmouth and 8.42 a.m. Portsmouth Harbour to London Bridge and 2.55 p.m. (made 3.15 p.m. in July) Portsmouth Harbour to Victoria. A Pullman car is run on the Continental boat trains on week-days and Sundays, leaving Victoria for Newhaven Harbour at 10 a.m. and 8.45 p.m., and Newhaven Harbour for Victoria at 6 a.m. and 4.45 p.m.

A number of detail alterations are announced all over the system, and a feature is that several main line trains now call at Purley, thus improving the seaside connections from that rising residential town. The Continental services, which, it will be remembered, were considerably improved last year by the opening of the new Pontoise route, will again perform the journey from London to Paris in eight hours. The departures from Victoria will be as heretofore, but commencing on June 25th, the arrivals in Paris will be 5.59 p.m. and 6.3 a.m. The cross-channel steamers are now all fitted with wireless telegraphy.

MIDLAND RAILWAY.

The summer train services on the Midland will, as usual, take effect from July 1st, when additional and improved services will come into operation affecting Scotland, the Lake District, the Isle of Man, Buxton, Matlock, Harrogate, Ilkley, the Eastern Counties, North and West of England, etc. The 11.50 a.m. express will again leave St. Pancras for Scotland and run without advertised stop to Carlisle, engines being, however, changed at Shipley as heretofore. New through services to Cromer, Yarmouth and other places on the Norfolk Coast will come into force on July 10th.

The through train from Leeds to Keswick at 9.35 a.m., returning at 12.35 p.m. on Mondays, Tuesdays, Fridays and Saturdays, will run from July 13th to September 19th. This train will stop at Kirkby Lonsdale and Sedbergh. A much improved service will be given from Newcastle and other important towns on the North Eastern line to the Isle of Man by the Heysham route *viâ* Harrogate, Otley and Skipton, by the 3 p.m. boat from Heysham and 9.30 a.m. boat from Douglas. Through trains will be arranged between Harrogate and Skipton conveying the through carriages for Heysham. A new train will be run from Ilkley to Harrogate in connection with the 8.35 a.m. through train Manchester to Ilkley. A return train will connect with the 6.30 p.m. Ilkley to Manchester (through train). This will improve the service between Colne, Burnley, Accrington, etc., and Harrogate. Improvements will be made in the service to and from Mansfield. A through carriage will leave Mansfield at 7.30 a.m., reaching St. Pancras at 10.40 a.m., and returning at 4.55 p.m., arriving at Mansfield at 8.5 p.m. A through train will also be run between Mansfield and Leicester in both directions.

A new departure is created by the running of a through carriage from Derby at 12 noon, calling at Leicester at 12.45 and Bedford at 1.58 p.m., connecting with a new train from St. Pancras at 3.12 p.m. for Southend. The return train will leave Southend at 10.45 a.m. for St. Pancras, with through carriage for Bedford, Leicester and Derby.

MIDLAND GREAT WESTERN RAILWAY.

The altered timing of the morning express from Broadstone will be the same as last year, and the same observation applies to the extension as between Mullingar and Galway of the 8.40 a.m. train, with a corresponding connection leaving Galway at 12 noon. The new features for this summer will be the running of a tourist express on Saturdays only during August, leaving Broadstone at 1.15 p.m., with connections to all the principal towns and tourist resorts in the West of Ireland. The corresponding train will run on Sundays only during August having a similar schedule to the week-day up "Limited Mail," and a connection with the outgoing mail boat from Kingstown to Hollyhead. This train will be provided with luncheon, tea, and dining facilities. As from July 1st tea cars will be provided on the 5 p.m. express *ex*-Broadstone to the West.

NORTH BRITISH RAILWAY.

The Lothian Coast expresses, connecting Glasgow and Edinburgh with North Berwick and other favourite east coast resorts, and the Peebles-shire express were resumed in June, while the Glasgow and Fife-shire Coast express commenced on June 15th, and runs daily, except Saturdays. In the western district the summer service on Loch Long was resumed as from June 1st, and the usual increased train and steamer services to the Clyde resorts are now in operation. On the West Highland line a new train leaves Glasgow for Fort William at 11.45 a.m. in place of the 10.9 a.m. and 12.43 p.m. trains from Glasgow. The 3.20 p.m. from Glasgow to Fort William is now the last through train to Fort William.

NORTH EASTERN RAILWAY.

In addition to the usual Summer alterations, applying from July 1st to September 30th, except where otherwise arranged, the following improvements may be noted:—An additional express will leave Newcastle for Alnwick at 8.15 p.m. in connection with the 2.20 p.m. dining car express from King's Cross, due at Newcastle at 8.3 p.m. An express train will leave Newcastle (Central) at 6.18 p.m., Saturdays excepted, giving additional services to Monkseaton, Whitley Bay and Cullercoats, *via* Backworth. The 11.55 a.m. express from Carlisle to Newcastle will be altered to leave

Digitized by Google

Carlisle at 12.20 p.m. in order to form connections with various trains at Carlisle. On arrival at Newcastle the train will connect with the 2 p.m express from Newcastle to York and the South. A new express will run from Harrogate to Leeds at 8.10 a.m., arriving at the latter place at 8.46 a.m., giving a quick service for passengers requiring to be in Leeds before 9 o'clock. On Sundays a train will leave Scarborough for York at 10.35 a.m., stopping at Ganton and Malton only, connecting with the 12.20 p.m. train to King's Cross, 12.30 p.m. to Normanton, 12.35 p.m. to the Great Central line, and 12.45 p.m. to the Midland line

SOUTH EASTERN AND CHATHAM RAILWAY.

For the last two or three years the summer train service developments on this line have been of an exceedingly interesting and notable character ; and this year still further amplifications and new facilities are included. The list of altered and additional trains is far too lengthy for reference in detail ; but the more important items may be briefly added. Some are already in force, others commence in July.

NEW TRAINS : 10.20 a.m. (Saturdays only, commencing in July), Victoria to Whitstable, Herne Bay and Margate West ; 11.30 a.m. (Saturdays only), Blackheath to Whitstable, Herne Bay, Margate West, Broadstairs and Ramsgate Harbour, calling at Woolwich Arsenal, Dartford, Gravesend Central and Chatham ; 12.25 p.m., Charing Cross to Hastings starts at 12.18 and runs *viâ* Beckenham and Bromley South, to give direct service from those stations to Tunbridge Wells, Bexhill and Hastings ; 1.55 p.m. (Saturdays only), fast train Victoria to Herne Bay and Margate West ; 10 p.m., fast train, Victoria to Faversham, Canterbury East, Herne Bay Westgate, Margate West, Broadstairs and, Ramsgate Harbour ; 6.30 a.m. (Mondays only), Ramsgate Harbour, Broadstairs, Margate West, Herne Bay, and Whitstable Town to Chatham and Cannon Street ; 8.45 a.m., fast train, Ramsgate Harbour, Broadstairs and Margate West, to Holborn ; 2.55 p.m. (Saturdays only, commencing in July), Ramsgate Harbour, Broadstairs, Margate West, Herne Bay and Whitstable Town to Cannon Street, calling at Chatham, Strood, Gravesend Central, Dartford, Woolwich Arsenal, and Blackheath ; 4.52 p.m. (Mondays and Saturdays only, commencing in July), fast train, Broadstairs and Margate West to Charing Cross.

ACCELERATIONS : 9.7 a.m., Charing Cross to Folkestone and Dover accelerated 20 min. ; 4.50 p.m., Charing Cross to Bexhill and Hastings, accelerated 10 min. to Bexhill and 20 min. to Hastings ; 5.32 p.m. (not Saturdays), Victoria to Faversham, accelerated and extended to Whitstable Town and Herne Bay ; 6.15 p.m. (not Saturdays), Cannon Street, to Kent Coast accelerated 13 min. ; 9.5 a.m., Dover Harbour to Victoria and Holborn starts at 9.30 and accelerated 22 min.

The train which last summer left Ramsgate Harbour at 10.15 a.m. for Victoria, starts at 10.10 a.m. and is accelerated 43 min. ; the train which last summer left Dover Harbour at 1.10 p.m. for Victoria and Holborn, leaves at 1.15 p.m. and is accelerated 40 min. The service in the East Kent district has been entirely rearranged with a view to accelerating the facilities between the more important towns. The through Great Western train from Birmingham, etc., is accelerated by 10 min., and is due at Dover Harbour at 5.34 p.m.

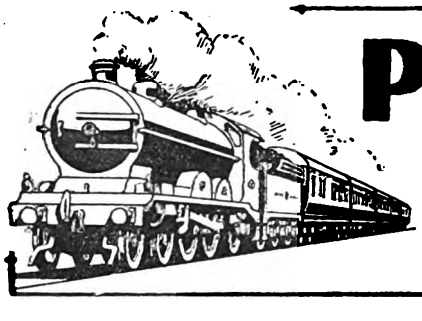
The 5.50 a.m., 10.37 a.m., and 12.20 p.m. (not Saturdays), down trains from Maidstone West, and the 7.46 p.m. (not Saturdays) from Maidstone West and 9.20 p.m. from Chatham are diverted *viâ* Woolwich and accelerated. These trains run fast between London and Woolwich, giving a through service between Woolwich, Gravesend, Strood, Chatham, Gillingham and Maidstone.

On Sundays also there are several altered and accelerated trains.

GREAT NORTHERN RAILWAY OF IRELAND.

As we go to press particulars are to hand concerning train service developments on the Great Northern Railway of Ireland. Commencing July 1st, the 9.0 a.m. train from Dublin will arrive in Belfast at 12 noon, instead of 12.10 p.m. The 9.55 a.m. train from Belfast will leave at 10.0 a.m. and arrive in Dublin at 1.0 p.m. instead of 1.5 p.m. There will be a through carriage from Warrenpoint to Dublin by this train. The 2.20 p.m. train from Belfast will leave at 2.30 p.m. and arrive in Dublin at 5.30 p.m. instead of 5.40 p.m. The 3.0 p.m. train from Dublin will arrive in Belfast at 5.45 p.m. instead of 6.0 p.m. It will cease to call at Scarva. There will be a through carriage from Dublin to Warrenpoint by this train. The 4.15 p.m. train from Warrenpoint will leave at 4.25 p.m. and arrive in Belfast at 6.5 p.m. instead of 6.0 p.m. The 3.20 p.m. train from Belfast to Dublin, on Sundays, will leave at 3.30 p.m. and arrive Dublin 6.50 p.m. instead of 6.45 p.m. The 12.20 p.m train from Clones will arrive in Belfast at 2.30 p.m. instead of 2.40 p.m. It will cease to call at Lurgan and Lisburn. The 1.45 p.m. train from Cavan to Belfast, will arrive in Belfast at 4.55 p.m. instead of 5.0 p.m.

Digitized by Google



PERTINENT PARAGRAPHS

Great Western Railway Cinema Matinee.

On Wednesday, May 20th, a new note in publicity methods was adopted by the Great Western Railway, in the form of a Cinema Matinee at the London Coliseum. The "Story of the Holiday Line" was shown by a long series of high-class cinematograph views; and the large attendance evidenced the appreciation accorded to this development on the part of the publicity department. Section 1 showed a train leaving Paddington, with places of interest within about 60 miles of London, a fine collection of views of Swindon Works setting forth the construction of one of the big 4–6–0 engines — No. 4041, *Prince of Wales*, to be precise—and a lengthy film showing the footplate while travelling. Section 2 dealt with Shakespeare Land, the valleys of the Severn and Wye, North Wales and South Wales, mainly from the scenic point of view. Fishguard and Southern Ireland provided subject matter for Section 3, while Section 4 was concerned with Wessex and Devonshire. The Cornish Riviera received attention in the concluding section. The display occupied about one hour and twenty minutes, with only one break for a song by Mr. Robert Chignell, who rendered two other selections while the pictures were being shown. The Coliseum Orchestra provided appropriate musical selections. Among those present were Lord Pirrie, Lord Churchill, Lord Breadalbane, Lord Barrymore, Lord Waldegrave, Sir Godfrey Baring, Lady Miller, Major-General Sir Charles Parsons, Colonel Ward, Professor Bickerton, the Hon. Misses Hammond, and Colonel Kingscote.

* * *

Luggage Facilities.

The luggage problem is so closely associated with holiday travel that attention may be drawn to the various facilities offered by most railway companies in connection therewith. Mr. A. Feiron, Publicity Manager, London and North Western Railway, has issued an interesting leaflet on this subject, and a few extracts therefrom may be quoted.

"Railway companies have done a great deal towards making the holiday-seeker happy on his journeys by relieving him of the trouble of looking after his baggage. The luggage in advance system is one of the greatest boons ever conferred upon the travelling public. A note to the company brings the collecting van to your door, and for an insignificant sum your impedimenta is conveyed to your hotel or lodgings to await your arrival. A few years ago the family's annual trip to the sea was a perfect nightmare to the father of the flock. There was the cab to the station, tips to the porters, frantic rushings up and down the train to see that nothing had been left on the platform, the same performance repeated at each junction, and by the time the destination was reached—probably with one or more articles short—the poor man was in a state of collapse.

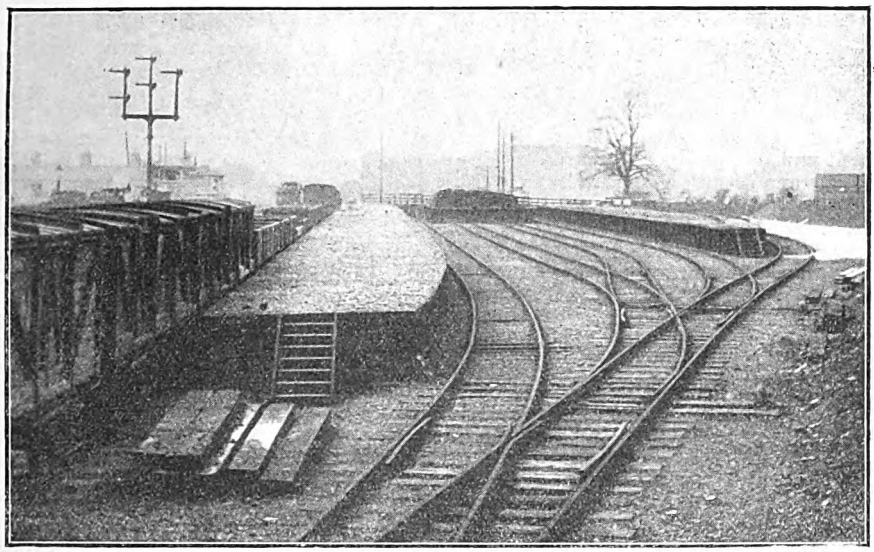
"There are still many people who prefer to take their luggage with them, and even luggage in advance does not always arrive when it should, and the railway companies come in for a large amount of abuse. They are not, however, invariably to blame for the delay and wrong sending of luggage. Often—one might say more often than not—the real fault rests with the sender. Badly written or incorrect addresses, carelessly attached labels, are the frequent cause of delay and loss of baggage, but the most prolific source of trouble is *old* labels and addresses. There are individuals who never take the trouble to remove old addresses, and there are others who take a pride in getting their bags and boxes covered with testimonies of their globe-trotting propensities. Picture to yourself, then, the dilemma of a porter at a junction station confronted with a piece of luggage bearing two or three addresses to various parts of the country, and perhaps a dozen railway and shipping labels to other spots more or less familiar to him. What can he do? What he actually does is to choose the newest-looking label and send the luggage accordingly—often with dire results."

* * *

Luggage which goes Astray.

Continuing, it is pointed out that "the railway companies have a most admirable and complete system for the tracing of missing luggage, and mostly the packages are recovered, but the inconvenience and annoyance caused to the owners may be more readily imagined than described. The writer is acquainted with a case where an old shipping label took a trunk to Liverpool and thence to Canada, instead of to Glasgow, and it was many weeks before news could be gained of it. In the meantime the passenger had been compelled to replace practically all the contents. Another passenger travelling from London to a station only twelve miles distant had his kitbag taken to the West Coast of Africa, owing to an old address. Many

Digitized by Google



Photo] [*L.N.W.R.*

SPECIAL PLATFORMS AT SHREWSBURY FOR ROYAL AGRICULTURAL SHOW TRAFFIC.

of the packages totally lost would undoubtedly never have gone astray had they been properly addressed and labelled by the owners.

"It is not generally known that the railway companies announce in their time tables and other notices that they disclaim all liability for expenses incurred in consequence of delays and losses caused by old addresses and labels, but such is the fact; and, when one considers the matter, it is unreasonable to expect them to pay under such circumstances. You may argue that they should refuse to accept luggage with several labels or addresses upon it, but this would involve more trouble and annoyance to the passenger. The true solution is for people to take greater care of their own property. If every traveller this summer took the trouble to wash all old labels off and place two labels on each of his packages with his address clearly written upon them, the railway companies' difficulties would be far less, and the improvement in the temper of travellers would be remarkable.

"A short time ago a lady travelling from Cambridge to a place in the Midlands lost a trunk. The companies made inquiries, the lady and her friends took endless trouble in calling, writing letters, and giving information, but the trunk could not be found. It was ascertained that several old labels were on the trunk, and each station mentioned was specially searched, but without success, and it was not until about a fortnight after the loss that the lady remembered there might be an address or label to a place in Cumberland. This place was tried and the trunk found. It is not likely that lady will lose her luggage again from the same cause.

"The reason for placing two labels on your packages is that railway porters are not perfect, and there are a few perhaps who might tear off the address tag. In that event the second label is invaluable. Then, of course, in a crowded luggage van often only one end of a package is visible, and if it happens to be the unaddressed end, overcarrying and consequent delay may result, or contact with other packages may remove a label, and if that label is the only one the chances of the package reaching the correct destination are somewhat remote. A good idea also is to place an addressed label inside the trunk on top of the contents."

* * *

Railways and the Royal Agricultural Show.

THE Royal Agricultural Show is being held this year at Shrewsbury, situated practically on the borders of England and Wales. The President for the year is the Earl of Powis, a descendant of the famous Welsh Prince of Powis. Many structural alterations have been made by the joint companies before it was felt possible to deal satisfactorily with the large volume of traffic expected. All live stock, implements and general goods traffic will be dealt with at the Abbey Foregate depôt. Commodious docks have been built on the up and down sides of Abbey Foregate station. A photograph, for which we are indebted to the London and North Western Railway, is reproduced, showing the docks on the up side. To build these docks the London and North Western wagon shops had to be removed, and the allotment gardens let to railway servants taken over. During the Show week excursion trains will be run from all parts of South and Central Wales, the Cambrian line, North Wales Coast, Birkenhead, Liverpool, Manchester, Birmingham, Blackpool, Northampton, as well as from London and centres on other railways. His Majesty the King is expected to visit the Show on Friday, July 3rd

Digitized by Google

Holiday Facilities on the Paris, Lyons and Mediterranean Railway.

In connection with the Lyons Exhibition very cheap tickets will be issued once a month, *vid* the Paris, Lyons and Mediterranean Railway, from London to Lyons. Rail and car services have been much developed recently on the Paris, Lyons and Mediterranean Railway. The "route des Alpes," now the "route des Alpes et du Jura," includes motor excursions on the highest Alpine roads of France. Circular tickets, combining rail and motor, are issued, available for 45 days. New services and regular tours have been organised in the Forest of Fontainebleau, in the Cevennes and the Tarn Gorges. A variety of tickets to the Provence, Dauphiny, Savoy, Auvergne, Cevennes and Jura districts are issued, including through returns, zone seasons, circular, holiday and family tickets. They allow cheap tours to such well-known health resorts as Aix-les-Bairns, Vichy, Evian-les-Bains, Royat, Chatel-Guyon, and such holiday centres as Chamonix, Grenoble, Clermont-Ferrand, Le Puy, Lyons, Avignon, Marseilles, Nîmes. To Chamonix (Savoy), Grenoble (Dauphiny) and Clermont-Ferrand (Auvergne) cheap excursions will be run on July 10th, August 1st and 29th. Every one of the renowned cities on the Riviera can be visited in Summer at reduced fares, breaking the journey anywhere *en route*. A tour in Switzerland can be combined with any journey on the Paris, Lyons and Mediterranean Railway, the principal ways of access being the Simplon route (*vid* Lausanne and Montreaux), the Geneva route (for Southern Switzerland), and the Chamonix Electric Railway in connection with the Martigny-Chatelard line. The Bernese Oberland is reached by the three routes. A national exhibition will take place at Berne. Short trips to the above centres can be arranged at certain dates when excursion tickets to Paris are issued. The Summer booklet, "Fascinating Holidays," copies of which can be had on application to the London office, 179, Piccadilly, W., gives full details.

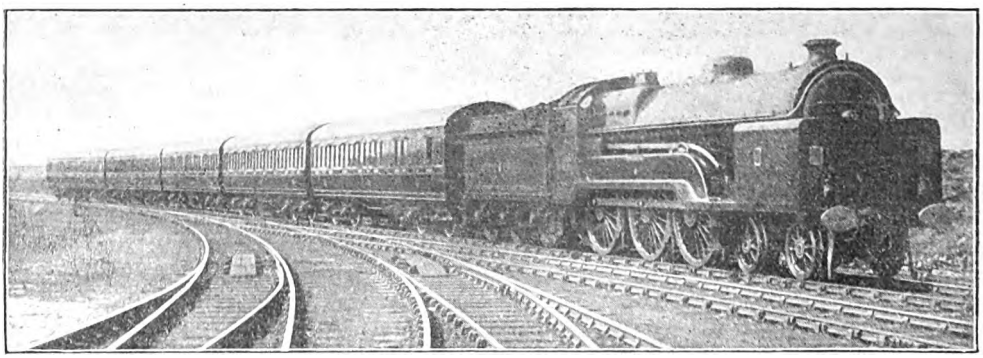
"The Travels of a Kitten."

Anecdotes concerning adventurous journeys taken by animals are numerous, but the following, sent by a correspondent, is worthy of record. Soon after the departure of the 6.55 a.m. train from Bath for Bournemouth a few weeks ago, the guard fancied he heard the faint mewing of a cat. He looked in all the corners of his van without success; but a repetition of the mewing at intervals, until the train reached Bournemouth, proved that his ears had not deceived him. At Bournemouth another more lengthy search was instituted, but again a blank was drawn. At 1.50 p.m. the return journey from Bournemouth to Bath began, and Bath was reached at six o'clock. The reiterated mewing of the mysterious cat continued throughout the journey. A very thorough search was made at Bath station and eventually a kitten belonging to the refreshment room at Bath Midland station, was discovered sitting on the gas cylinder underneath the guard's van. The round journey was nearly 143 miles, and the time occupied, including stoppages en route and at Bournemouth, about 11 hours. The kitten seemed no worse for its perilous ride; and on being liberated upon the platform, it lost no time in lapping up the saucer of milk placed before it.

* * *

The London and South Western Railway in South-East Devon.

A reader queries a statement made in an article under this title published last month to the effect that an Adams' 4–4–2 tank engine "is at present working" the Lyme Regis branch. This was so at the time of the author's visit, though the actual number of the engine used was not noted; but a photograph has since become available showing an Adams' 0–4–4 tank engine at Lyme Regis station, so that our present correspondent is probably thinking of a visit when one of these engines was in use.



CHESHIRE LINES COMMITTEE.

Train of new vehicles built at the Dukinfield Carriage and Wagon Works of the Great Central Railway, to the designs of Mr. J. G. Robinson, Chief Mechanical Engineer, for use on the Liverpool-Manchester express services of the Cheshire Lines Committee. The engine shown is No. 423 *Sir Sam Fay*, which conveyed these vehicles on the trial trip to Southport.

Digitized by Google

What the Railways are Doing

As the birthplace of England's greatest poet, Stratford-on-Avon is known throughout the civilised world, and the programme for the Shakespeare summer season in August, added to the natural beauties of the district, should make it popular with holiday makers this summer. The theatre programme will be carried out under the direction of Mr. F. R. Benson, assisted by the Repertory Company, now touring in America, and by other well-known artists; and will include many of Shakespeare's historical plays, in addition to a wide selection from the comedies and tragedies. A conference of teachers of English will also be held during the first week of August in connection with the Shakespeare Summer Festival. Special facilities are given by the Stratford-upon-Avon and Midland Junction Railway "Shakespeare Route" for those visiting Sulgrave, the home of the Washingtons, and these will prove of great convenience to the thousands of American and other visitors who annually come to Stratford. S.M.J. trains run in connection with the fast expresses of the Great Central, Midland, and London and North Western Railways. A postcard to Mr. A. E. Diggins, Secretary and Traffic Manager, Stratford-upon-Avon and Midland Junction Railway, Stratford-on-Avon, will secure a free copy of a well illustrated and compactly compiled guide to the district.

* * *

THAT travellers from afar almost invariably re-visit the lovely scenery of the English lake-land is the proud boast of the local patriots in the districts served by the Furness Railway, and much is made of the fact that here existed the homes of Romney, Ruskin, Southey and Wordsworth. It is, however, doubtful as to how far the hotel-keepers and others realise to what extent they have to thank Mr. Alfred Aslett, Secretary and General Manager of the Furness Railway, for the prosperity they enjoy. The glorious lakes and their surroundings as a holiday haunt are beyond question, but it has been largely the efforts of Mr. Aslett, not only in Great Britain but in America and the Continent, that have contributed so much to the present-day popularity of the district. As in former years Mr. Aslett, from his offices at Barrow-in-Furness, is distributing an attractive programme of twenty rail, lake and coach tours through the district served by the Furness Railway.

THREE two-coach motor trains will be placed in service during the summer months by the London and South Western Railway. One will be used on the Seaton branch, the second on the Lee-on-the-Solent section, and the third will run between Honiton and Exeter. In addition to the Holiday Season Tickets introduced last year and covering the Bournemouth, Swanage and New Forest sections, similar tickets are being issued this year for the North Devon, East Devon and North Cornwall districts. The areas now covered by these tickets are (1) Lyndhurst Road to Swanage, also Wimbourne and Hurn; (2) Axminster to Exeter and all the branches to the south of this section; (3) Bude and Padstow to Halwill Junction, also Wadebridge to Bodmin; (4) Torrington and Ilfracombe to Barnstaple. The third class fares for Nos. 1, 2 and 3 are 8s. 9d. one week, 14s. 6d. two weeks, and 19s. 9d. four weeks. No. 4 is issued at 5s. 6d. one week, 8s. two weeks, or 12s. four weeks.

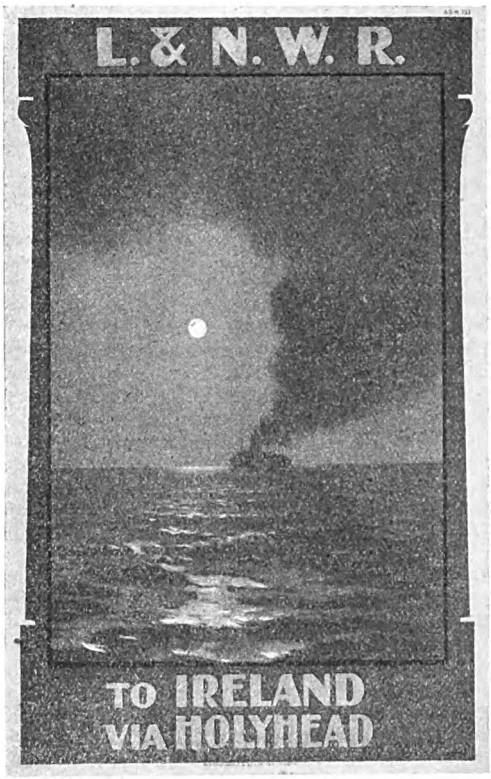
* * *

NEW trains constructed almost entirely of steel are being constructed at the York carriage works of the North Eastern Railway, to the designs of Mr. V. L. Raven, Chief Mechanical Engineer, for use on the 10 a.m. services between King's Cross and Edinburgh. Very little wood will be used in their construction, and what there is will be treated to render it non-inflammable. The steel work is treated so that it will have the same ornamental appearance as wood. Each train will consist of ten coaches. The kitchen coach will contain no accommodation for passengers. Other coaches will be illuminated entirely by electric light, gas being used only for cooking purposes. The cars are 60 ft. in length over all, and fitted with elliptical roofs. It is stated that one of the trains will be on exhibition when Their Majesties visit Hull to open the new Joint Dock.

* * *

ALTHOUGH Great Eastern 2-4-2 and 0-6-0 tank engines do splendid work, there has been real need for some time past for a tank engine design suited more to the heavy suburban traffic in the London area, and we understand that Mr. A. J. Hill will shortly introduce a 0-6-2 class having Belpaire boilers pressed to 180 lbs. per sq. in., inside cylinders 18 in. by 24 in.,

Digitized by Google



A BEAUTIFUL NIGHT SCENE AS DEPICTED BY LONDON AND NORTH WESTERN RAILWAY POSTER.

coupled wheels 4 ft. 10 in. diameter, and 3 ft. 9 in. radial trailing wheels. The weight, with about 1,500 gallons of water and 3 tons of coal, is estimated at 60 tons, distributed over a 23 ft. wheelbase, which is thus divided between centres: leading to driving 7 ft. 6 in., driving to rear-coupled 8 ft. 9 in., rear-coupled to trailing 6 ft. 9 in. The tractive power will be 19,788 lbs., and the adhesive power 23,495 lbs. One of these engines will be fitted with superheating apparatus.

* * *

MR. A. J. HILL is completing four new restaurant cars for use in Great Eastern summer traffic. Two are first-class and kitchen cars and two third-class cars. The vehicles are 54 ft. long, 8 ft. 9 in. wide, and 8 ft. high inside from floor to ceiling. The vestibules are of the new standard pattern, and the roof of the standard elliptic type. Large observation windows are employed and fitted with sliding ventilators as adopted on the more recent dining cars. The first-class cars, fitted with glass louvre ventilators, seat twenty passengers, and have a corridor passing round and enclosing the kitchen. The third-class cars are divided into two saloon compartments, one of which will seat twenty-four and the other eighteen passengers.

COMMENCING May 30th, convenient trains were introduced on the District Railway to Barking, connecting with the "Belle" boat trains *viâ* Tilbury Pier. Passengers are able to obtain at District stations cheap third-class return tickets to Tilbury Pier, and to the holders of such tickets, on presentation at the booking office at Tilbury, reduced rate saloon tickets are issued by the "Belle" steamers. Passengers can thus travel expeditiously from the western and central portions of London by the "Belle" steamers for the East Coast resorts at no increase in the fares, as against joining the boat at London Bridge.

* * *

AMONG the various interesting displays shown by railway companies at the Anglo-American Exposition, that of the Metropolitan Railway is of special interest. The exhibit includes an "Upper Quadrant" semaphore, a "repeater" below it, a "train describer," a "train stop" appliance, a "step down" transformer for reducing the voltage of the current tapped from the mains down to that required for the signal control and other subsidiary purposes, an illuminated diagram, and a few other appliances.

ONE OF THE BEST CHILD-STUDIES INCLUDED IN THE "OPEN AIR PICTURE GALLERY."

Digitized by Google

Digitized by Google

DELIGHTFUL HOLIDAYS
ON THE SHORES OF
CARDIGAN BAY
TRAVEL BY THE
PICTURESQUE ROUTES OF THE
CAMBRIAN RAILWAYS
For Illustrated Booklet and full information, apply to Mr. W. HERBERT WILLIAMS, Superintendent of the Line, Cambrian Railways, Oswestry.

A PICTORIAL CALL TO THE CARDIGAN COAST.

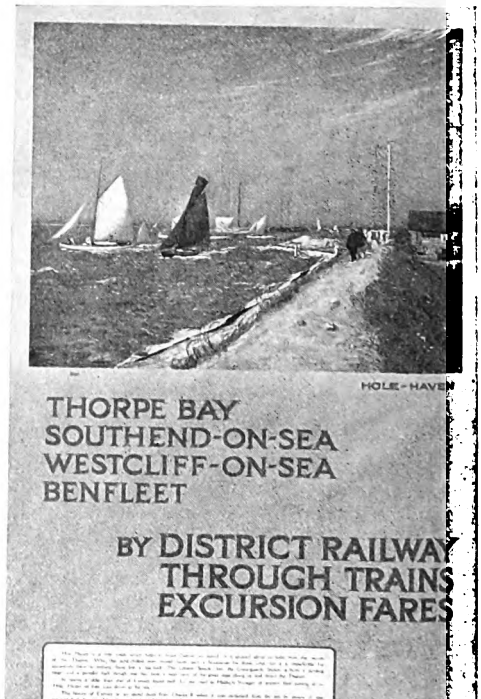
We regret to record the death of Mr. William Wainwright, Vice-President of the Grand Trunk Railway of Canada. Born in Manchester in 1840, Mr. Wainwright early devoted his talents to railway work, in the pursuit of which they won him fame and fortune. After serving the Manchester, Sheffield and Lincolnshire Railway in a variety of capacities, between those of junior clerk in the accountant's office and secretary to the General Manager, he went to Canada in 1862 at the suggestion of Sir E. Watkin, and entered the service of the Grand Trunk. Beginning as a senior clerk in the Chief Accountant's office, Mr. Wainwright rose steadily until he became Senior Vice-President of the Grand Trunk in 1911, and Second Vice-President of the Grand Trunk Pacific. At 2.30 on May 13th, every train on the Grand Trunk and the Grand Trunk Pacific Railways, from Moncton to Prince Rupert and from Montreal to Chicago, came to a standstill for one minute, and work was suspended in every shop of the system as a tribute to the deceased.

* * *

In the minds of those unacquainted with the district North Staffordshire is not usually associated with holiday making. To the uninitiated the summer tourists and excursion arrangements of the North Staffordshire Railway presents many surprises, and the literature concerning the districts served provides the proverbial eye-opener" to the resident afar, who is seeking a new holiday haunt. Burrow's Guide to North Staffordshire issued with the compliments of the North Staffordshire Railway in addition to descriptive text, contains a map and 40 coloured and other illustrations. "Picturesque Staffordshire" by means of facts and photographs is calculated to dispel the idea held by many people, that it is a "bleak and stony county." A number of the illustrations in this book depict attractive railway scenes. Another booklet issued on behalf of the Company by the General Manager, Mr. W. D. Phillipps, describes and illustrates the toy railway through the beautiful Manifold Valley. Folders distributed by Mr. Phillipps from his office at Stoke-on-Trent, deal with the Rudyard Lake district and give particulars of the tourist, week-end and day excursion arrangements. Rudyard Lake is more than two miles long and provides boating and fishing, among beautiful Midland scenery.

* * *

Among the many popular Summer arrangements of the Midland Railway again in operation this year is the delightful Wednesday half-day Express Excursion from London (St. Pancras) to the famous Peak District of Derbyshire in



AN ATTRACTIVE POSTER ISSUED BY THE METROPOLITAN DISTRICT AND MIDLAND RAILWAYS.

Digitized by Google

MAP SHOWING AREA COVERED BY ONE OF THE MIDLAND RAILWAY'S DERBYSHIRE HOLIDAY CONTRACT TICKETS.

vestibule car trains. The service is given from June 24th to September 9th inclusive. Passengers leave St. Pancras at 11.35 a.m. and arrive back in town at 10.40 p.m. For visitors making a lengthy stay in Derbyshire, the holiday contract ticket system is a decided boon. On this page is illustrated the area covered by a ten shilling third class ticket of the description referred to. One of these tickets enables the holders of ordinary return, tourist, or long date week-end or long date excursion tickets to travel for two weeks as often as desired from and to any station between Ambergate, Buxton and Grindelford (via Chinley) inclusive.

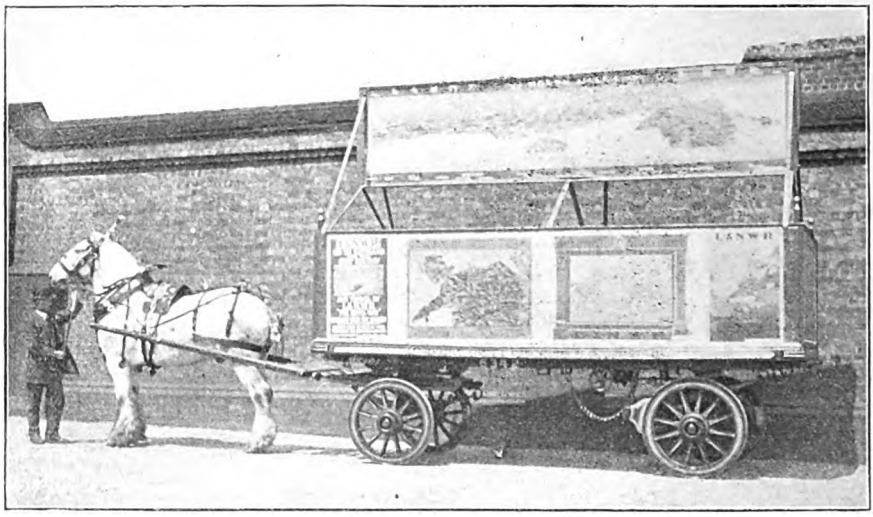
* * *

FROM the headquarters of the Lancashire and Yorkshire Railway, Manchester, year by year, there issues a steady stream of railway holiday literature of a high standard of merit. Blackpool is, of course, the great holiday town of the Lancashire and Yorkshire Railway system, and so it is quite appropriate that the well-produced hotel, boarding-house and apartments booked for 1914 should bear on its elegant wrapper a fine view in colour of Lancashire's holiday Mecca. The edition for 1914 contains the usual valuable features and information. "Holidays on the Belgian Coast" is produced in conjunction with the North Eastern Railway, and illustrates and describes the holiday attractions and characteristics of Heyst, Knocke, Le Zoule, Blankenberghe and Ostend, in addition to emphasising "The direct route from the North and Midlands of England to Belgium, France, Germany and Switzerland is *viâ* Hull and Zeebrugge." For the traveller who desires in compact form facts and figures concerning the railway he is traversing, the company have published a booklet entitled "Lancashire and Yorkshire Railway: Interesting Statistics, Year Ending 31st December, 1913."

* * *

LEASED by the Swansea Improvements and Tramway Company, the Mumbles Railway and Pier provides a means whereby the residents of Swansea and district, likewise holiday makers, may enjoy the health-giving breezes from the Atlantic Ocean. The history of the line is of great interest, for the undertaking is the outcome of a railway originally worked by horse traction and established by an act of Parliament passed 29th June, 1804. Opened in 1807, it connected Oystermouth with Swansea, but in 1889 it was extended to Mumbles Head, and in 1898, the beautiful pier, which runs about 800 feet into the sea was constructed. Visitors to South Wales should not fail to travel over what is practically "the oldest railway in the world"

Digitized by Google



Photo] [*L.N.W.R.*

LONDON AND NORTH WESTERN RAILWAY.

Advertising lorry which led the London and North Western Railway contribution to the Annual May-Day Horse Procession at Liverpool on May 16th.

Excellent bands are engaged for the pier. For example, on Sunday, July 5th, the band of H.M. Royal Marines from Chatham will be in attendance, while a succession of concert parties occupy the stage week by week during the summer season.

* * *

To impart concise and accurate information regarding the charms of Strathpeffer Spa, the Highland Railway has produced a charming booklet, which will be of great value to health-seekers and holiday-makers; likewise a safe and reliable guide to the medical profession. Profusely illustrated and daintily printed, the booklet, which can be obtained gratuitously from Mr. Park, the company's General Manager, at Inverness, should do much to promote the popularity of Strathpeffer Spa, which, situated in the heart of the Scottish Highlands, has all the restful quiet and select seclusion of a country village and yet is in close and easy touch with the great centres of population. Another free booklet issued by the Highland Railway bears the awesome title of Ho-ró-a Ghàidhealtachd, which being interpreted means "Hurrah for the Highlands." This little work is well illustrated, and gives in tabloid form happy hints as to how healthy holidays may be spent among the heathery hills of North Britain.

* * *

Motor coaching through the magnificent mountain and lake scenery of Connemara is a deservedly popular feature in the tourist arrangements of the Midland Great Western Railway of Ireland. The company's motor coaches run between Clifden and Westport on week-days from June 1st till September 19th. Full particulars of the foregoing, likewise facts concerning the seaside golf links served by the Midland Great Western line, tours, day excursions, combined railway and hotel tickets and other valuable facilities offered the holiday-maker or man of leisure visiting the Emerald Isle, can be gleaned from the Achill, Connemara and West of Ireland time table and programme of tours gratuitously issued by the Traffic Manager, at Broadstone station, Dublin, who likewise will provide the intending traveller with a sixpenny illustrated guide book descriptive of the districts served by the system.

* * *

There is a tendency to associate Sussex with the favourite coast resorts along its southern border; but inland it is one of the most picturesque and interesting counties. A booklet, entitled "The Heart of Sussex," published by Messrs. Benn and Cronin, Ltd., and obtainable from the Publicity Department, London, Brighton and South Coast Railway (price 6d., post free), is designed first to direct attention to what the inland districts of Sussex have to offer the tourist; and secondly it constitutes a guide to the many places of interest, to facilities for visiting them, and directions as to walks, rambles and the like. It is well produced, with numerous artistic views and sketches, and the letterpress is condensed so that the reader is told what he desires to know without having to wade through pages of guide book literature, only a small portion of which would probably appeal to him.

* * *

As usual, the Summer posters issued by the London and North Western Railway are distinguished for their artistic excellence. That shown on page 86 is by F. Whatley, and is a companion to the seascape views previously used for poster purposes. It is a night scene

Digitized by Google

showing a London and North Western steamer crossing from Holyhead to Ireland. Mr. Whatley has also produced a good train view of an Irish day express, drawn by an engine of the "George the Fifth" class. His beautiful "paddling" poster bearing the inscription "Summer Breezes on the Wicklow Coast" is reissued. Of a different class are the scenic geographical posters relating to the Lake District, North Wales, resorts on both sides of the Irish Sea, and the Lleyn Peninsula. Others relate to "Leafy Lytham"; the Ashbourne and Dovedale districts (type with a lovely scenic view in half tone); Blackpool—"The Wonderland of the Waves"; the Spas of Central Wales, including a beautiful view of the Rock Park Pump Rooms, Llandrindod Wells.

* * *

FOR the first time in the history of railway advertising the District Railway Company are using the silhouette as a means of attracting traffic, and are now displaying in their trains some fine photo-lithographic reproductions of a set of eight striking designs of places served by the line and its connections. The originals, which are the work of Mr. H. L. Oakley, were cut direct with the scissors. The subjects treated are Southend, a study of the shore at low tide, with fishing boats on the beach and warships in the offing; a punting scene on the river at Kingston; and Teddington Reach, with the white canvas of the sailing boats standing out against the dark background of trees. Then there are Richmond Park, with trees and deer; Wimbledon Common, with golfers near the windmill; a study of the lake in Kew Gardens; the main street of Denham Village; and a wonderful representation of cattle watering at Sudbury. The Underground Company have also issued a very fine poster (page 88) by Charles Pears—Hole-Haven, a delightful seascape showing Hole-Haven. This is accompanied by an interesting description of the scene depicted.

Another series of posters is designed in a style in general use on the Continent. They are from the brush of Paul Reith, a young German artist of the Munich Art School, and are very striking examples of three and four-colour work, remarkable for simple yet vigorous treatment.

A poster which is considered to be one of the most beautiful yet exhibited on the Underground lines depicts two children sitting on a hill-side and draws attention to the fact that quietude and peace of the country may be reached by Underground or motor-bus. The artist who executed the original is Miss Ethel Everitt.

* * *

To stimulate travel by the picturesque routes of the Cambrian Railways, a number of excellent picture posters are employed. The latest, known as "The Bathing Girl," is illustrated on page 88. In the original the colours are beautifully blended and the off-set inks used to print the lettering and borders show to striking advantage.

Two notable posters have been issued by the South Eastern and Chatham Railway. One is reproduced on page 86. The other depicts a huge illuminated street sign placed on a road traffic island, with boards bearing the names of principal resorts served by the railway. These are described as ideal centres for health and pleasure.

* * *

"WHERE to take the children for their holidays" is not always an easy matter to decide, but the Lancashire and Yorkshire Railway does its best to assist a decision by means of a remarkable poster just issued. In the centre the query above quoted is propounded, and artistic photo views displayed in various positions support the claims of Blackpool, Southport, Lytham and St. Anne's to provide effective answers. Four of the views represent children in various seaside attitudes, while at the base is a long string of seaside donkeys, with their riders and attendants. The whole scheme is exceedingly effective.

* * *

FOR the use of German visitors to England, the Great Central Railway provides a highly creditable set of well printed and charmingly illustrated folders and booklets, printed in the language of the Fatherland, but not in gothic type. For English speaking patrons of the Continental route *via* Grimsby, a folder and a booklet have recently been issued. These publications give the traveller—on whichever side of the North Sea he has his home—just the kind of information he requires, as to tours and sailings. The new saloon steamers between Grimsby and Hamburg and Antwerp are becoming increasingly popular with passengers between Great Britain and Germany, Denmark, Belgium and Switzerland.

* * *

THE Great Western Railway have placed a further order for six "Edison-Buckwalter" Electric Trucks with the Railway Track Supply Co. (of Great Britain), 79½, Gracechurch Street, London, E.C. This is the fourth order placed by this railway for "Buckwalter" trucks since September last. "Edison-Buckwalter" trucks are now being used by quite a number of railway companies, etc., in this country. We understand that the Great Western Railway intend employing the trucks just ordered for platform service.

* * *

WE understand that the Schmidt Superheating Co. (1910), Ltd., have commenced legal action against Mr. J. G. Robinson, the Great Central Railway and the Superheater Corporation, Ltd., in respect to the exploitation and usage of various patents in connection with locomotive and marine superheaters of designs now associated with Mr. Robinson's name. Such action has been pending for some time, and the progress of the case will be carefully watched by all interested in the present action.

Digitized by Google

A remarkable poster, measuring 10 feet square, is now exhibited by the London, Brighton and South Coast Railway. The artist is Mr. Fred Taylor. It is an exaggerated view of the interior of Victoria station, with passengers of all classes hurrying towards the trains, to reach the favourite "Sunny South" resorts.

* * *

A NEW catalogue, dealing primarily with 15-in. gauge miniature railway equipment, has been issued by Messrs. Bassett-Lowke, Ltd. In this field the firm mentioned have realised a high standard of excellence, and many notable locomotives and equipments have been completed. Among the installations and examples of practice referred to is the Sand Hutton Railway, recently described in the RAILWAY MAGAZINE. A 4–6–2 express locomotive for this gauge recently completed by Messrs. Bassett-Lowke is illustrated below.

* * *

IT is reported from Cardiff that the Taff Vale Railway Company have recently placed an order for six locomotives with the Hanover Engineering Company. The locomotive building firms in this country are fully booked up with orders, and the German firm has undertaken delivery of the six locomotives by the end of this year.

* * *

THE Hon. L. A. Waldron, Chairman of the Grand Canal Company, Ireland, and Mr. Joseph Tatlow, Director, Midland Great Western Railway, have been elected respectively, Chairman and Deputy-Chairman of the Dublin and Kingstown Railway Company.

* * *

A SERIES of poster stamps have been issued by the Great Northern Railway. Four characteristic posters are thus utilised, printed in colours, as in the originals, and no doubt effective use will be made of these as publicity media.

* * *

THE illustration on page 473 of the June RAILWAY MAGAZINE shows a Great Central "mixed traffic" 4–6–0 locomotive working a special train over the North Eastern Railway, and not a North Eastern locomotive as stated.

* * *

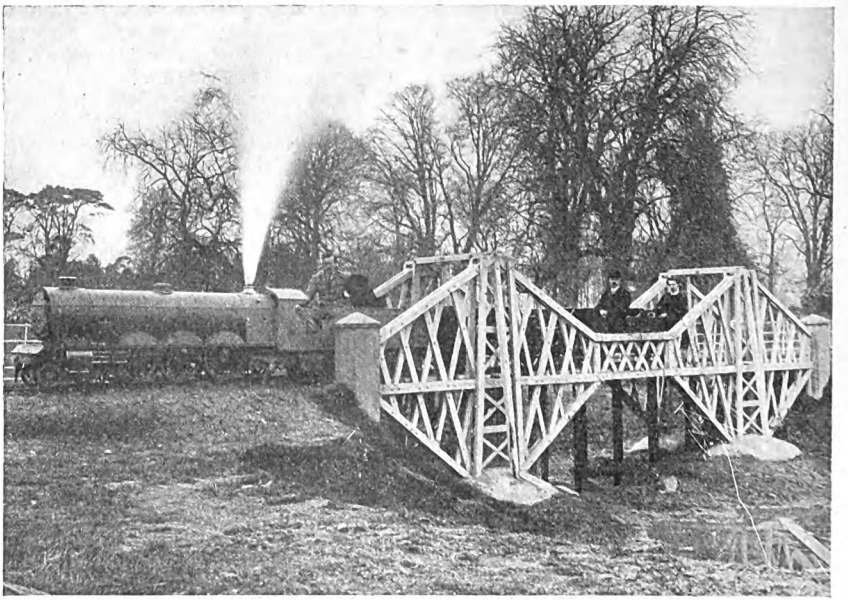
Two locomotives specially adapted for dealing with the fish traffic at the New Harbour Works, Aberdeen, have been ordered by the Great North of Scotland Railway from Messrs. Manning Wardle & Co. Ltd., of Leeds.

* * *

ADDITIONAL 4–6–0 four-cylinder locomotives of the "Princess" class, Great Western Railway, are No. 4049 *Princess Maud*, No. 4050 *Princess Alice*, No. 4051 *Princess Helena*, and No. 4052 *Princess Beatrice*.

* * *

WE are officially informed that the dining car arranged to be run on the Killarney express, Great Southern and Western Railway, will not be provided this summer.



MR. J. E. R. HOWEY'S 4–6–2 MODEL LOCOMOTIVE, STAUGHTON MANOR RAILWAY.
Built by Messrs. Bassett-Lowke, Ltd.

Digitized by Google

Digitized by Google

GREAT EASTERN RAILWAY:

"NORFOLK COAST EXPRESS."

Published by "THE RAILWAY MAGAZINE."
Photograph by F. E. Mackay.

Digitized by Google

GENERAL VIEW OF KING'S CROSS STATION, LONDON.

Notable Railway Stations and their Traffic.

KING'S CROSS—GREAT NORTHERN RAILWAY.

By J. F. GAIRNS.

IN August, 1850, the Great Northern Railway was opened as a main railway to the north following a more easterly direction than the original route *viâ* Birmingham; and in October, 1852, the station at King's Cross was brought into use in replacement of the temporary terminus to the north of Copenhagen Tunnel. At that time King's Cross was situated virtually on the confines of London, the site selected being one which has been described as a "gigantic dustyard" in a neighbourhood which then had a very unsavoury reputation.

With the erection of the station the King's Cross district developed considerably, and in course of time, instead of being on the outskirts, King's Cross has become one of the great traffic centres of the Metropolis, and the terminus the headquarters of many important train services. In fact, the location is now an ideal one in many ways, though the need for bringing suburban business men directly into the City has caused the development of auxiliary lines and routes, so that King's Cross is essentially a main line station, its own suburban traffic—actually a very considerable factor—being more or less supplementary to that which is operated to and from Moorgate Street and over the North London Railway.

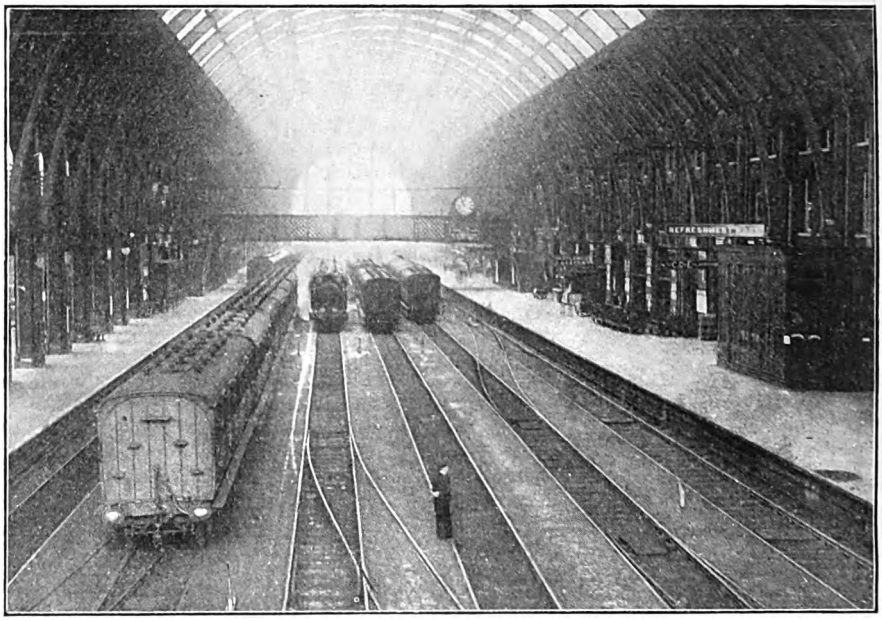
Situated at the confluence of Euston, Gray's Inn and Pentonville Roads, with Caledonian Road, King's Cross Road and Pancras Road joining nearly at the same spot, the location is very convenient as regards road access; while the Metropolitan, City and South London, and London Electric Railway stations adjacent to and connected with the terminus, render it one of the best served railway centres of the metropolis. In fact the three underground stations are so connected that it is possible to pass direct from any one to another, or into the main station, without leaving station premises and under cover throughout. These connections provide easy access from

Digitized by Google

almost any part of London, either directly or by means of simple interchange facilities, so that whatever complaints there may have been in days gone by as to the relative inaccessibility of the station, though ever since the Metropolitan Railway was made it has always been better served in this respect than certain other great termini, the situation is now an exceptionally favourable one in this respect.

From the point of view of architecture the Great Northern station presents an unusually plain frontage to the road, though there is a suggestion of business-like simplicity about the two great train sheds blatantly revealed to public gaze, instead of being hidden away behind a massive hotel building as is now the usual practice, with the clock tower between. It must be remembered that King's Cross was built at a relatively early period, that its neighbour, St. Pancras, which now emphasises the simplicity of King's Cross station, was not thought of until many years after the Great Northern Railway started in business, and that while architectural "experts" may lament the loss of "a great artistic opportunity" the terminus was erected in accordance with strictly utilitarian ideas—for use and not for show—and that no pretence was made towards any other result. Even the hotel, actually a somewhat imposing building, was placed at one side, and does not figure at all prominently in general views of the station, though it has been an essential factor in Great Northern accommodation virtually as long as the station has been open.

The main station includes the two great train sheds, each 800 ft. long, 105 ft. wide and 75 ft. above rail level in the centre, and their spacious dignity does much to compensate for the alleged lack of exterior distinction. In fact, the view of the station from inside ranks as an exceptionally impressive one. The arches were originally supported by laminated wooden girders of unusual design, but in course of time these have been largely replaced or strengthened,



MAIN DEPARTURE PLATFORMS.

while the original general offices on the departure side, and the newer office premises built about 20 years ago over the cab road on the arrival side, complete a structure which satisfies both engineering and architectural criticisms, interiorly, if not exteriorly.

The arches are joined by a strong brick wall carried on abutments, with numerous openings, so that the platform which embraces the columns, and therefore extends into both sections, is a fairly wide one, and is not seriously obstructed seeing that the two sides are considered as separate platforms.

On the departure side there are only the two platforms, No. 1 alongside the offices

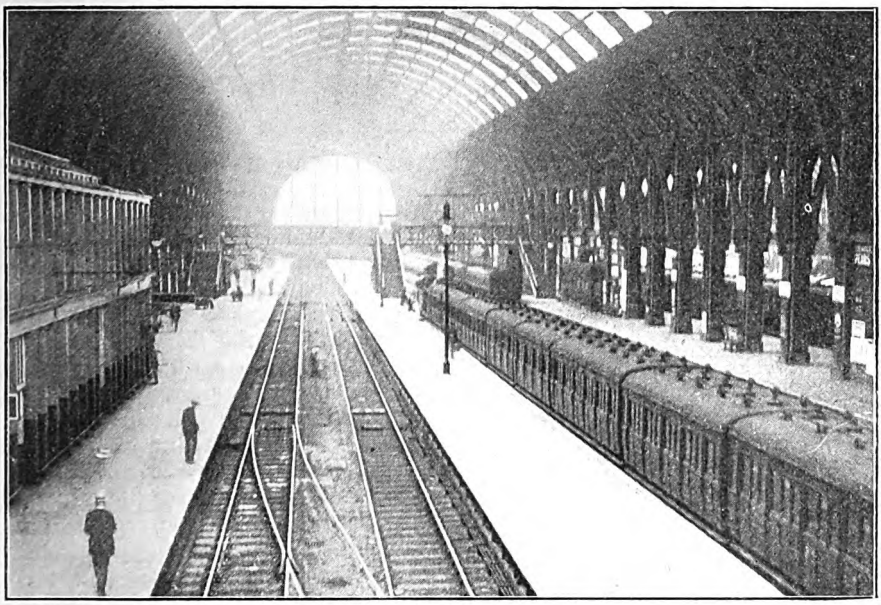
Digitized by Google

and buildings, where so many of the principal expresses are started, and No. 2, against the dividing wall, serving as an auxiliary main line departure platform. Between these are four empty carriage and shunting roads, connected by turntables near the buffer stops for transferring horse boxes, carriage trucks, etc., while crossovers give access also to the platform lines.

The arrival side accommodates five lines. No. 1 arrival (at King's Cross the system of continuous numbering of platforms was discarded some years ago, so that it is necessary to specify which section of the station is concerned) is the extreme platform, with a cab road parallel therewith. As far as possible all principal expresses use this platform, but No. 2 alongside necessarily receives many of the long distance trains. Both these platforms are of full length, but No. 3 is let into the outer portion of the other side of No. 2, the inner portion serving No. 4. These two platforms are usually reserved for local and shorter trains, though each will take a full length suburban set of vehicles. No. 5, adjacent to No. 2 departure, is again of full length, but is principally used for storing suburban trains, as it is only required at busy periods.

There are thus seven platforms in the main station, but to amplify the departure accommodation three other platforms are available in the suburban station placed angularly on the departure side. These are known as platforms C, D and E, the last mentioned being an auxiliary main line departure platform, while C and D are principally reserved for suburban trains.

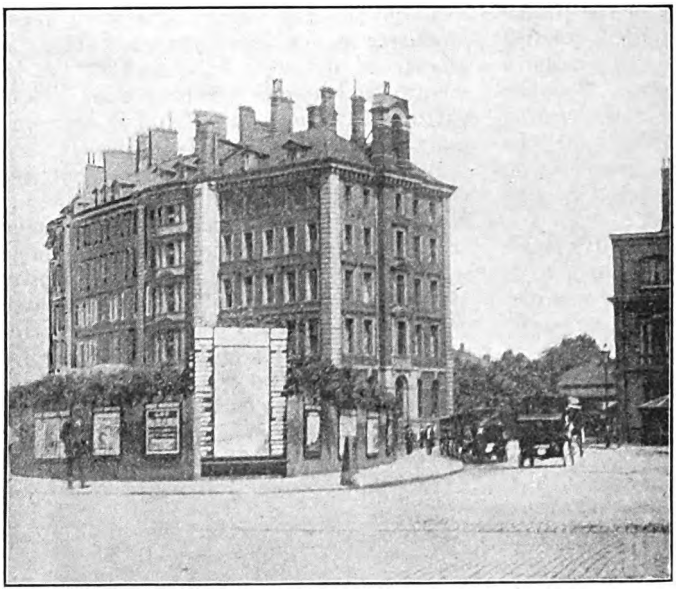
Beyond the local station is a somewhat restricted space reserved for locomotive purposes, with turntable, coal stage and engine lines. On the other side of the boundary wall of this area is the down line from the Metropolitan Railway, partially on the 1 in 43 grade by which trains from Moorgate Street reach the main line from the Metropolitan station. This is known as platform B, or as King's Cross suburban station ; while the space beyond has been developed in later years to provide an additional platform ("A") for suburban trains starting from King's Cross, with a triangular platform served by two lines for horse and carriage traffic, and a larger triangular platform, also served by two lines, for dealing with the very heavy milk traffic.



INTERIOR : ARRIVAL SIDE.

In view of the fact that the ends of some of the platforms in the main station can be conveniently used for horse and carriage traffic, a good deal of work of this class is now carried on there, as it avoids the shunting of vehicles over to the special platforms mentioned ; but considerable use is made of the special accommodation, while the milk

Digitized by Google



GREAT NORTHERN RAILWAY HOTEL AT KING'S CROSS.

platform, formed with a low level area within the triangle so that vans can be backed directly opposite to the railway vans, is kept very busy at certain periods of the day. In the course of a year about 250,000 milk churns are dealt with here, four or five special milk trains being run every day, with many others attached to ordinary trains. Fruit and other traffic is also dealt with at these platforms, the direct access by road *viâ* Chenies and Edmund Streets and Pancras Road enabling this and like traffic to be conducted conveniently and without reference to the rest of the station.

On the arrival side it is also necessary to mention York Road station, just beyond the further end of No. 1 arrival, and used by trains passing to the Metropolitan Railway. This station is peculiar in that it deals with trains in one direction only, trains the other way coming from the Metropolitan Railway *viâ* B platform already mentioned.

Outside the station there are, of course, numerous running, siding and shunting lines, and these settle down into six, two in each of the three tunnels by which rail access to the station is rendered so inconvenient. The centre one is the original, the other two having been constructed later. That to the west is now used for two down suburban lines, the usual practice being to operate them so that a local train from platform C, D or E can leave at the same time as one from the Metropolitan Railway *viâ* platform B or starting from platform A. The western road in the centre tunnel is the down main, while the other line is used for shunting purposes, and for transferring trains from the arrival to the departure side of the station, though it is signalled and can be used for through traffic in an emergency, or for movements of empty trains. The eastern tunnel receives the up main and up local lines, the latter also serving York Road station.

A peculiarity of King's Cross station is that, speaking generally, the departure and arrival traffic is kept quite distinct. Empty trains for the departure platforms can approach the station *viâ* the carriage line in the centre tunnel; but there is no access from the ordinary running lines used by up trains. The character of the traffic, and the methods in vogue, are, however, such as to minimise any difficulties which might arise from this fact.

Before dealing with the traffic and train services it will be convenient to review the various buildings, offices and other factors affecting the station and its business.

The best impression of the station is had by means of the cab road leading to the departure side. This is an unusually wide and impressive thoroughfare, and as the hotel is also in view, King's Cross station is seen at its best in this direction. Here are wide gateways, flanked by entrances to the underground system of subways connecting with the tube stations, while the fencing along the footway is adorned by a veritable picture gallery of the best pictorial posters issued by the Great Northern Company and railways operating in connection.

On the arrival side the general aspect is somewhat discouraging—with only the plain wall extending along York Road and the omnibus yard in front of the station to enliven the view. Between these entrances the intervening area is now occupied by the "pink stationette"—to use a description recently applied to it—of the London Electric Railway, yards for omnibuses and parcels vans, a mail office for post office purposes, the "Jubilee" cloak room (now used mainly

Digitized by Google

for heavy parcels and commercial travellers' traffic) and a new erection for the reception of emigrants passing through London. Here they are supplied with light refreshments; and arrangements are made for checking their tickets. There is also a time office for certain sections of the staff. Adjacent to the end of the office buildings is an excursion office.

Transversely across this end of the station is a cab and omnibus yard, while the circulating area is provided with a special excursion booking office. It also gives access to two subways connecting with the underground stations adjacent.

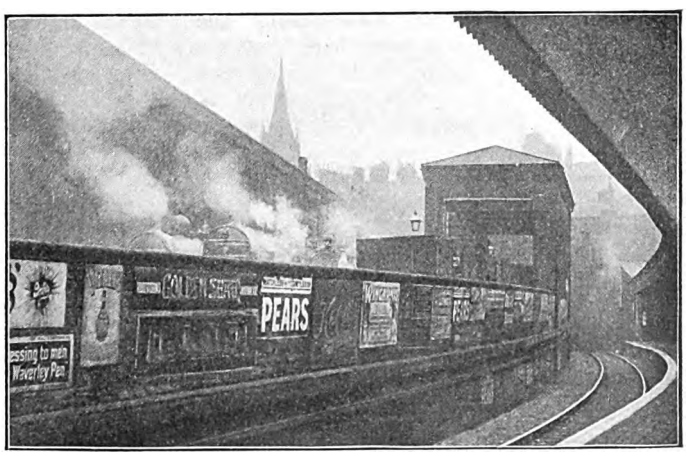
As already mentioned the cab road along No. 1 arrival platform is now covered in by a series of offices accommodating the engineer's, chief traffic manager's, goods manager's, surveyor's, police and other departments of the headquarters staff, the clerical dining rooms and other divisions. Near the buffer stops, on ground level, are cloak rooms, and along the platform are omnibus and theatre ticket offices, a small refreshment room, two drinking fountains, two train indicators, and at the further end a series of parcels offices, with clerical offices overhead, devoted mainly to the general parcels work of the railway. Vans for this division use the cab road for access and exit.

At the end of the platform the cab road rises to the level of Battle Bridge Road which crosses the railway over the station, while foot passengers can proceed direct to York Road station. Entering cabs desiring to take up positions on the arrival side usually proceed first to the yard of York Road station, and under the control of a policeman are allowed into the main station as required. A series of gas holders supplied from the oil gas plant and connecting with the gas mains laid alongside various lines in the station for supplying the carriage reservoirs may be seen at the further end of York Road platform.

It is, however, on the departure side that the principal accommodation is provided. Below the buildings, and partially below the platforms is a series of departments associated with the dining car, refreshment and hotel services. Here are elaborate stores, for utensils, crockery and glassware, as well as for food, wine and the like; including kitchens for cooking meals for the hotel, station dining rooms and to some extent supplying the cars on the trains, though the usual practice is for meals to be cooked in the car kitchens. Further along are other storage departments.

On platform level the season ticket offices first call for attention, followed by the telegraph office, cloak rooms, bookstall (one of the largest in use anywhere), and the main booking office, a spacious division adorned with illuminated views and spanned by a gallery connecting the general offices above Beyond is the tea room, dining and grill rooms, waiting rooms (here there are several very fine models of engines, steamers, etc.), refreshment rooms, a new enquiry office replacing the older one further along the platform, label board room, locomotive inspector's office, guards' room and several other offices, besides a small third class refreshment room.

Above are the general offices, the main corridor crossing the booking hall by the gallery above mentioned. At the end nearest to Euston Road is the board room, a spacious and well designed apartment, with large portraits in oils of Mr. Edward Becket Denison and Lord Colville of Culross, names which have figured prominently in the annals of the Great Northern Railway Company, besides other portraits and pictures of interest. An alcove over a projecting portion of the season ticket office below enables a splendid view of the principal



SUBURBAN PLATFORM, SHOWING ENGINE SIDINGS ALONGSIDE MAIN LINE STATION.

Digitized by Google

COVERED AREA IN FRONT OF MAIN LINE BOOKING OFFICE.

departure platform and of a considerable portion of the rest of the station to be had, while the main windows overlook the approach road and courtyard. Near by are the Chairman's and Directors' private waiting and committee rooms, while further along and on the floors above are the General Manager's, Secretary's, solicitors', accountants', and divisional chiefs' offices and private rooms.

The main line booking hall opens on to a wide courtyard, part of which is entirely roofed over, for cabs and carriages bringing passengers to the station. Opposite this is a wooded enclosure, constituting the hotel garden, and it is from here that the proportions and design of the hotel can best be appreciated. From the corner of Euston and Pancras Roads the hotel is well in view; but its main aspect is from the booking hall courtyard, where full effect of its crescent design can best be appreciated.

Beyond the booking hall the courtyard connects by gates in a dividing wall with Edmund Street, and terminates as a covered courtyard for parcels vans serving the parcels office on No. 1 departure platform.

The local station has its own booking hall adjacent to the circulating area serving platforms C, D and E. It fronts upon Chenies Street, where it joins Edmund Street, outside the boundary wall of the original station. Here are booking offices, a small refreshment room and other apartments, while a hall-like passage at the side gives access to platforms B and A in the suburban station. A staircase in this passage gives access to the linen department, dealing with towels and drapery for the dining cars and first class rolling stock, as also for the hotels, waiting rooms and other departments.

On platform B is also a small refreshment room, with a few staff offices. The platform for C and D is open, except for the all-over roof covering these lines together with platform E. The latter joins No. 1 departure platform at the further end and can be reached therefrom about midway to enable passengers to proceed directly thereto after passing through the main booking hall. A few staff offices, including a room for dining car attendants, are also provided on this platform. Recently a selected series of pictorial posters have been placed along the wall of platform E.

Alongside the milk platforms beyond platform A, a lofty block of dwellings may be observed. This was erected to replace houses removed when the station was erected, and is the property of the railway company. In fact, many of the employés reside here. The ground floor is largely used for carpenters', tinsmiths', gas fitters' and other small shops required for the miscellaneous purposes of the railway.

In Chenies Street there is an Institute for the uniform staff attached to the station. This includes a hall for meetings and concerts, a billiard and games room, and a library. Light refreshments are also supplied by the attendant. In Edmund Street, opposite the boundary wall of the main station, are the stables for the horses attached to the parcels department. This is arranged on two floors, an inclined roadway enabling the horses to walk up to their stalls on the first storey.

As Superintendent of the Line, King's Cross station is under the control of Mr. W. Hills, a gentleman who has 43 years of efficient railway service to his credit; and is deservedly popular with the staff all over the system. After working his way through various departments Mr. Hills was in 1889 placed in charge of the

Digitized by Google

advertising department. Then in 1894 he became "rolling" stock controller, and in 1896 District Superintendent from London to Peterborough. In 1902 he became Superintendent of the Running Department, and in 1911 he was selected to be chief of a combined department including the General Superintendent, Running Superintendent and Chief Passenger Agent, his present title being assumed after disuse for a considerable period when other systems of organisation were in force.

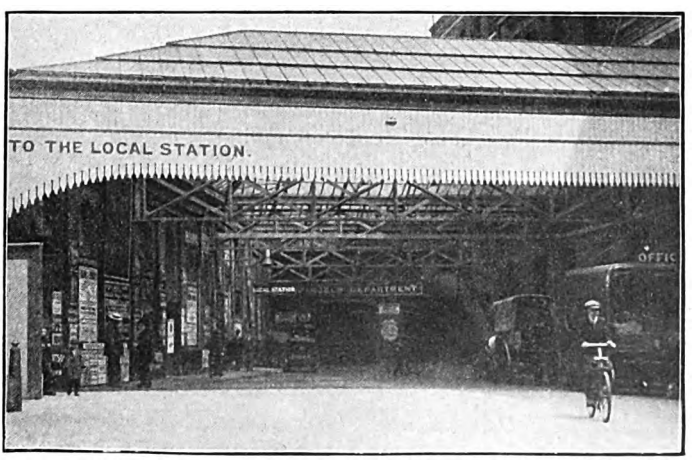
The actual working of the station is under three gentlemen, the booking office being directed by Mr. A. D. Cottrell, the parcels department under Mr. Peacock, while the whole of the remaining station staff is under the Stationmaster, Mr. W. H. Kemp, who succeeded Mr. Melsom over eight years ago. Mr. Kemp is a capable railway officer possessing the distinction of not having occupied a stationmaster's position before coming to headquarters in London. His training has, however, been of a comprehensive character. Commencing at Wakefield in a lowly capacity he gradually worked his way up, serving principally in the Leeds district in various positions, including Platform Inspector, Travelling Ticket Examiner, Divisional Inspector and attached to the District Superintendents office.

Mr. Kemp is assisted by Mr. Devereaux as night stationmaster, 10 station inspectors, 1 guards inspector, 2 yard inspectors, 2 stock inspectors, and 1 omnibus inspector, 6 foreman porters, 28 collectors and examiners and a large staff of porters and other uniform men. The two signal cabins which control traffic in the station (the West box with 140 levers and the East with 100 levers), together with Belle Isle up and down, Copenhagen up and down and Goods and Mineral Junction boxes, are also under his direction, representing a total of 24 men.

To review the train services in detail is needless, so that a few remarks will be sufficient in conclusion. It is somewhat remarkable that although the Great Northern Railway ranks so highly in the transportation system of the country, so much of its long distance traffic is in connection with other companies. On its own account the Wakefield, Leeds and Bradford traffic is the principal factor from the commercial point of view; and in this connection the Great Northern Railway is essentially the business man's railway. The favourite 7.15, 10.10, 1.30, and 5.45 p.m. down Leeds expresses, with the corresponding up trains, including the Wakefield non-stop due in at 5.27 p.m., convey large numbers of regular travellers, while for general traffic between the Metropolis and the towns mentioned the Great Northern is pre-eminently *the* railway. All the principal trains are made up of the characteristic vestibuled cars, with restaurant accommodation.

Next in importance is the Anglo-Scottish traffic, in some respects the heaviest, but in this case the Great Northern is only one of the three companies whereby the "line of steel" which serves the east coast from London to Aberdeen is constituted. These are all heavy trains, timed as fast as is conveniently practicable, though the palm of speed must be given to the Leeds and Sheffield special expresses. The famous 10 a.m. (the original "Flying Scotsman"), 11.20 a.m. (summer only), 2.20 p.m. and the night trains at 7.55 and 8.15 (one train at 8.0 p.m. in winter), 8.45, 11.30 and 11.45 p.m., together convey an enormous Anglo-Scottish traffic every day in the year; and in summer any or all of them may require to be duplicated or even triplicated at times of special pressure such as the eve of "St. Grouse" and the days immediately preceding the famous 12th of August.

All the night services convey sleeping



COVERED AREA LEADING TO PARCELS DEPARTMENT.

Digitized by Google

Digitized by Google

PLATFORMS C, D AND E.

cars, the stock for these, as also the ordinary vehicles and the restaurant cars on the day trains, being East Coast Joint Stock. There are also other joint services with the North Eastern Railway, especially the 5.30 p.m. Newcastle-Stockton and Middlesbrough express, and the summer 11.25 a.m. and 1.20 p.m. Scarborough and Whitby trains; besides which a great deal of North Eastern traffic is conveyed by East Coast trains.

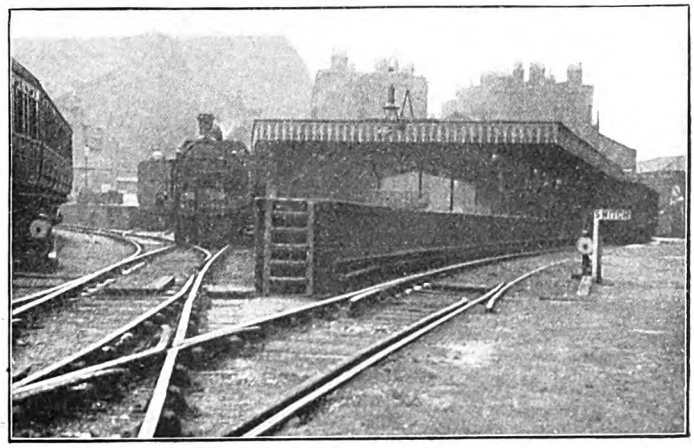
Other services such as that to Harrogate are also operated in conjunction with the North Eastern Railway, while the Sheffield and Manchester service is provided in collaboration with the Great Central Railway. The Hull and Grimsby through carriages and special trains in connection with the Wilson line and other Norwegian and Scandinavian steamers further widen the activities of the Great Northern Railway.

By means of the Midland and Great Northern Joint Railway, effective services are given, in some cases with restaurant cars, to East Anglian resorts, while to East Lincolnshire the Great Northern Railway has its own private holiday area, and is creating a steadily and by no means insignificant traffic, though Skegness, Sutton-on-Sea and Mablethorpe obtain their principal support from the industrial towns of the midlands.

To Nottingham, Doncaster, Grantham, Peterborough, Newark, Retford, Boston, Lincoln and other towns, the Great Northern Railway carries large numbers of passengers; and the same may be said of many secondary towns served by its trains. The Cambridge trains also count for a great deal, a really splendid service being provided.

But although a "northern" railway the Great Northern is now a factor in Kent Coast traffic. Two services are given daily, one arriving at 12.20 p.m. and the other at 1.25 p.m. with departures at 2.41 and 2.55 p.m. Of the former the first consists of through carriages from Ramsgate, Broadstairs, Margate and Westgate to King's Cross, serving the 12.30 p.m. intermediate Great Northern express, as well as making a convenient connection with the Scarborough, Leeds, Harrogate and Scottish expresses at 1.20, 1.30, 1.40 and 2.20 p.m. besides other trains. The second comes from Deal, Dover and Folkestone, and serves the 1.30, 1.40, 2.0, 2.20 p.m. trains. The vehicles for these services are South Eastern and Chatham, and are brought over the Metropolitan Railway *viâ* platform B and backed into a convenient platform for transfer of passengers and luggage.

The departures are made from No. 1 arrival platform, by backing into York Road station to reach the Metropolitan



MILK TRAFFIC PLATFORMS.

Digitized by Google

MR. W. H. KEMP.
Stationmaster, King's Cross Station, Great Northern Railway

MR. A. D. COTTRELL.
Clerk in charge of the booking office.

lines. The 2.41 train goes to Folkestone Dover and Deal, while the 2.55 is virtually the "Granville" express of the South Eastern and Chatham Railway, a portion of which starts from King's Cross for Margate, Broadstairs and Ramsgate.

Besides the main line traffic an enormous volume of suburban traffic is also dealt with. It is noteworthy that virtually all trains from Moorgate Street pass through platform B without stopping between 5.13 and 7.0 p.m., with similar arrangements on Saturday afternoons, an entirely distinct service of ordinary and fast suburban trains being started from platforms A, C, D and E and occasionally from No. 1 departure platform. There are also corresponding arrivals in rapid sequence during busy periods on the arrival side.

King's Cross also has its share of special traffic, including royal specials at by no means infrequent intervals, steamer trains in connection with the "Viking," B and N, Polytechnic and other Norwegian tours, as also many special trains for Newcastle, Scotland and other districts, and the Skegness and other day and half-day trips. In addition there is the heavy milk, fruit, parcels and other traffic mentioned before, with pigeon-flying and numerous other specials by way of further variety.

The writer is indebted to various officers of the Great Northern Railway for facilities and information utilised for the preparation of this article, particularly Mr. Kemp, the now well-known stationmaster.

Digitized by Google

The Continental Services of English Railways.

III—THE EAST COAST ROUTES.

By DENIS O'DONOGHUE.

THIS section of our subject covers three main divisions, (1) Great Eastern Railway facilities *viâ* Harwich, (2) the Great Central Railway services *viâ* Grimsby, and (3) the Hull and Goole services operated by Lancashire and Yorkshire Railway steamers, in one case in conjunction with the North Eastern Railway. All three count for a great deal in the great industrial centres of Lancashire, Yorkshire and neighbouring counties, affording good means of communication, both for the business man and for the tourist, between busy northern towns and various Continental centres, whereby it is unnecessary to travel *viâ* London; but as the Great Eastern Railway is also a factor in Continental traffic to or from or passing through London, it will be convenient to deal first therewith.

The Great Eastern Railway maintains a daily steamer service between Harwich and the Hook of Holland, and a daily service, Sundays excepted, between Harwich and Antwerp. The "Hook of Holland" mail route is the quickest from London to Holland and a first-class comfortable route to Germany, Denmark, Norway and Sweden. A boat train leaves London (Liverpool Street station) every night at 8.30 p.m., and the steamer leaves Parkeston Quay, Harwich, at 10 p.m., arriving at the Hook of Holland at 5.10 a.m. (Dutch time). One advantage of this route is that passengers have about 30 minutes in the quiet waters of the harbour to get comfortable in their berths before reaching the open sea, and in the other direction they have about 30 minutes to dress before landing. The traveller on arriving at the Hook finds express corridor trains awaiting him with through carriages to the chief towns of Holland and Germany. In addition to the principal Dutch towns, through corridor carriages are run between the Hook of Holland and :—

1. Bremen and Hamburg (for Denmark, Norway and Sweden) *viâ* Rotterdam, Utrecht, Amersfoort, Almelo, Salzbergen and Rheine.

2. Berlin *viâ* Rotterdam, Utrecht, Amersfoort, Almelo, Salzbergen, Osnabrück and Hanover.

3. Cologne, Wiesbaden, Frankfort, Homburg, Bad-Nauheim and Munich *viâ* Rotterdam, Geldermalsen, Tiel, Nymegen and Cleves.

4. Cologne and Heidelberg, *via* Rotterdam, Nymegen and Cleves.

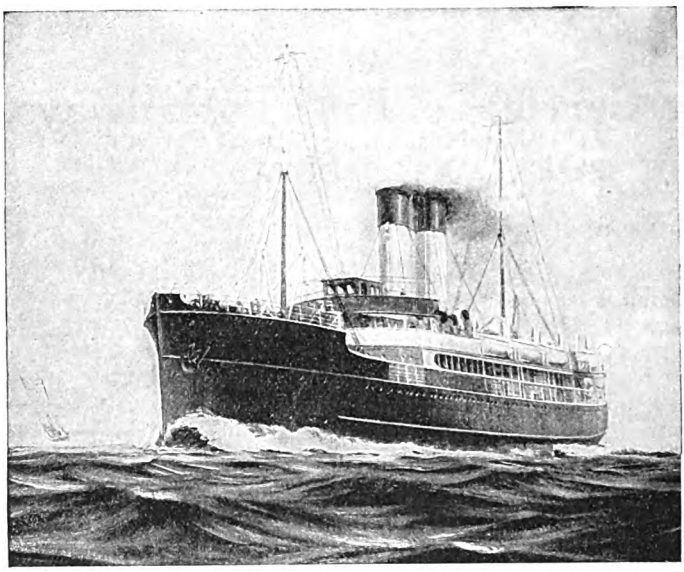
Passengers *viâ* the Hook of Holland for Rotterdam, the Hague, Leyden, Haarlem, Amsterdam, and other Dutch towns are very soon at their destination, The Hague, Amsterdam and Scheveningen being reached in time for breakfast. The services to North Germany have been greatly improved and accelerated, and Hamburg, Berlin and Dresden are reached much earlier than formerly. Berlin is within 19½ hours of London and Dresden 23 hours *viâ* the Hook of Holland. For the additional comfort of those travellers who prefer to remain on board the steamer a couple of hours after arriving at the Hook, a later express train has been arranged to leave at 7.50 a.m. for Rotterdam and Amsterdam.

The Hook of Holland route also affords communication with Russia and with China and Japan *viâ* the Trans-Siberian Railway. Pekin can be reached from London in 13 days and Tokio in 15 days. A glance at the map will show that the Hook of Holland, Berlin and Warsaw are almost dead east of Harwich.

For the Antwerp service a corridor express train leaves Liverpool Street station at 8.40 p.m. for the boat sailing from Parkeston Quay at 10.0 p.m. Passengers have time to dress and breakfast leisurely the next morning while the steamer is completing the voyage up the Scheldt, the actual time of berthing at the Quai d'Herbouville depending to some extent on the tide in the river. The steamer arrives at Antwerp at 8 a.m. in time for the 8.20 a.m. train for Brussels, exceptional weather excepted.

Travellers to the Continent from the north and Midlands also find the Harwich route

Digitized by Google

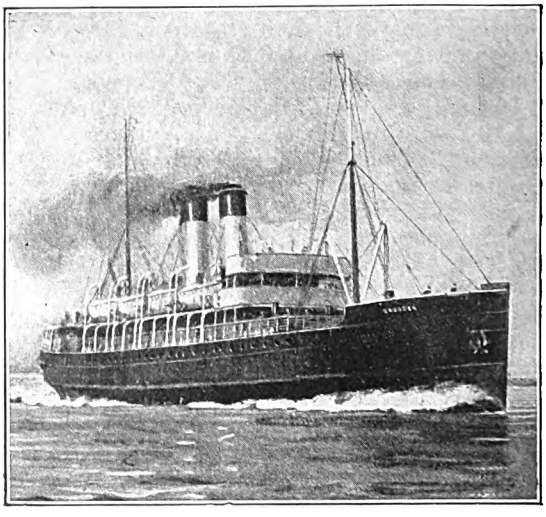


GREAT EASTERN RAILWAY ROYAL MAIL STEAMER, *St. Petersburg*. HOOK OF HOLLAND SERVICE.

appeal especially to them on account of the through train facilities to Harwich, avoiding loss of time, expense and the trouble of changing from one terminus to another in London. A Continental boat express runs from York to Harwich, and through corridor carriages run from Liverpool, Manchester and Sheffield (Great Central Railway) *viâ* Lincoln and March; from Bradford and Leeds (Great Northern Railway) *viâ* Doncaster, and from Birmingham (London and North Western Railway) alongside the steamers at Parkeston Quay. The formation of the North of England and Harwich boat train on arrival at Parkeston Quay is as follows:—From York, Brake third, Corridor third, Restaurant Car (3rd class), Restaurant Car (1st and 3rd class), Restaurant Car (1st class), Brake Van; from Leeds and Bradford *viâ* Doncaster, 1st and 3rd Brake Composite; from Liverpool *viâ* Lincoln, 1st and 3rd Brake Composite; from Manchester and Sheffield *viâ* Lincoln, 1st and 3rd Brake Composite; from Birmingham and Rugby *viâ* Peterborough, 1st and 3rd Composite; and brake van.

The Great Eastern Company owns a fleet of eleven steamers, three being engaged in cargo services only. The steamers *St. Petersburg*, *Munich* and *Copenhagen* working on the Hook of Holland service are new turbine vessels built on the Clyde, and specially designed for the service. They are 343 feet long and 45 feet beam, with a tonnage of upwards of 2,500, and engines of 8,500 indicated horse-power; wireless telegraphy and submarine signalling apparatus are installed. The sea crossing of 104 miles is made in under seven hours by these vessels. The accommodation on these ships has many points in common with ocean liners, consisting of fine saloons and restaurants; spacious promenade decks; enquiry and booking offices; post and telegraph offices; smoking and ladies' saloons. The cabins, like the vessels throughout, are ventilated and heated on the "Thermo Tank" system, and electrically driven fans and steam connections furnish a plentiful supply of fresh air.

Steamers performing the service between Harwich and Antwerp—140 miles—are the *Amsterdam*, *Brussels*, *Dresden* and *Vienna*, with a tonnage of 1,400 to 1,800, and engines of 4,000 to 5,500 horse-power. These are twin-screw ships, and are fitted with wireless telegraphy and submarine



GREAT EASTERN RAILWAY STEAMER, *Dresden*: ANTWERP SERVICE.

Digitized by Google

signalling apparatus. The vessels reserved for cargo only are the *Clacton*, *Cromer* and *Newmarket*.

Besides these services three others are maintained from Harwich, (1) General Steam Navigation Company to Hamburg, (2) the Esbjerg service by the Danish Royal Mail steamers of Det Forenede Dampskibs-Selskab of Copenhagen, and (3) the Gothenburg sailings of the Thule Steamship Company.

The steamers of the General Steam Navigation Company sail twice weekly between Harwich and Hamburg, leaving Parkeston Quay at 10.30 p.m., and perform the voyage in about 30 hours, of which, under ordinary circumstances, only 18 hours are on the open sea. The boats are large full-powered vessels lighted by electricity and fitted with wireless telegraphy and submarine signalling. Passengers for the Hamburg boat leave London (Liverpool Street station) at 8.40 p.m. on Wednesdays and Saturdays, and on the journey to England leave Hamburg at 9 p.m. on Wednesdays and Saturdays, arriving in London about 8 a.m. on Friday and Monday mornings.

ARRIVAL OF THE CONTINENTAL EXPRESS AT PARKESTON QUAY STATION.

Danish Royal Mail steamers *A. P. Bernstorff*, *J. C. La Cour*, *N. J. Fjord* and *Primular*, large ships of 1,500 to 2,500 tons and 2,000 to 3,600 indicated horse-power, sail four times a week in each direction between Harwich and Esbjerg, a port of Denmark just north of the German frontier, the sea journey of 350 miles taking about 22 hours. This service opens up direct communication from England to Denmark, Norway and Sweden *viâ* Harwich, and in connection with the sailings the Great Eastern Railway issues through tickets to all the principal points in Scandinavia. The boat leaves Harwich about 9.45 p.m. after the arrival of the 7.13 p.m. train from London on Mondays, Wednesdays, Fridays and Saturdays, and Esbjerg at about 4.45 p.m. on Mondays, Tuesdays, Wednesdays and Saturdays after arrival of the 8.20 p.m. train from Copenhagen. Through trains run between Esbjerg and Copenhagen in connection with the arrival and departure of the Harwich boat.

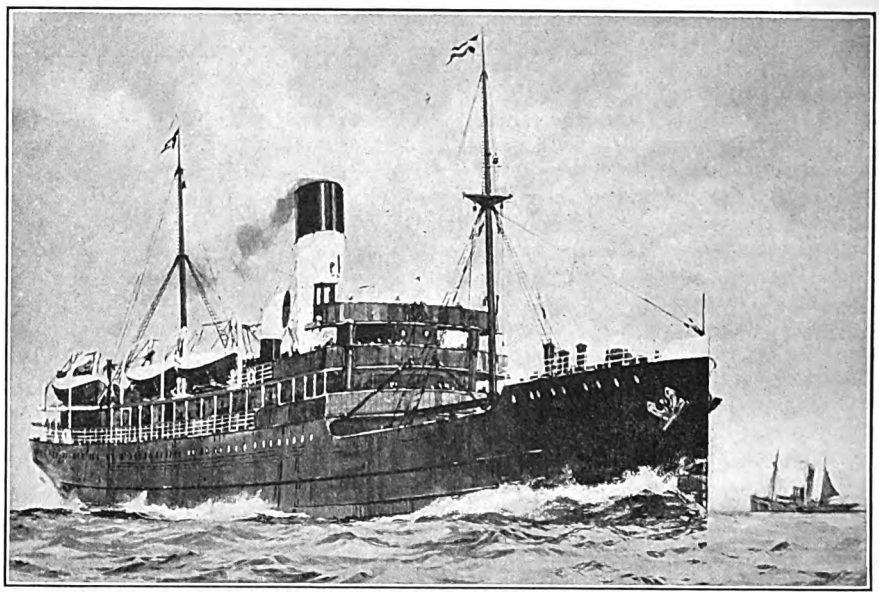
Swedish Royal Mail Steamers plying between Harwich and Gothenburg, the *Saga* and *Thule*, fitted with wireless telegraphy, sail from Harwich every Saturday at 6.15 p.m., arriving at Gothenburg at about 9 a.m. on Monday morning. The boat for England leaves Gothenburg at 10 p.m. on Saturdays, berthing at Harwich at about 11 a.m. on Monday. In connection with these sailings, through tickets are issued to Stockholm, and to places in Finland and Russia.

All services considered, it will be seen that the Great Eastern Railway plays a very large part in the Continental business, the traffic passing through Harwich over and above that shipped in its own steamers being voluminous. Much of the traffic passing by these routes is of a business character, but these vessels carry many thousands of holiday-makers and tourists every year. The Great Eastern boats land passengers at convenient centres for exploring the sights of Belgium and Holland. The Hook of Holland route is the crack service of the Company, and from the Hook main lines of railway penetrate to all parts of the Netherlands, Germany and Switzerland. The Antwerp boats serve a busy industrial district, but while Belgium, the most densely populated country in the world, thrives on its industries, it possesses in its art galleries a priceless collection of world-renowned paintings, besides providing many favourite tourist grounds. Holland owns great art treasures, but its attraction for visitors lies more in the peculiar physical features of the sea-

Digitized by Google

board country which constitute its chief claim to notice.

A very fair idea of the country of Holland and its people can be obtained in a week-end visit, for which the Great Eastern Company issues tickets at a very low fare by the Hook of Holland boats to Amsterdam. Leaving London on Friday night one can see something of the sights and country and be back in London early on Monday morning. Amsterdam is reached at 7.30 a.m. on Saturday, and a good plan is to make a start about 10 o'clock for the Zuyder Zee, visiting Broek in Waterland, where the old church is an item of interest. From Broek a tram carries the tourist to Monnikendam, which contains some old houses of the picturesque style and a very large church with some good carving. A sailing vessel or motor boat is the means of transport from Monnikendam to the Isle of Marken, where the inhabitants are nearly all employed in fishing, although perhaps the business of showing strangers over their quaint abodes is as profitable as fishing. A boat takes one from Marken to Volendam, the haunt of artists, who are attracted in great numbers by the old wooden houses and quaint costumes of the inhabitants. In the Hotel Spander, close to the harbour, sketches by Burne Jones, Phil May, Tom Browne, Stanhope Forbes, and many others adorn the walls. Half-an-hour's walk along the towing path takes one from Volendam to Edam, or the journey may be made by boat or steam tram. Edam is old-fashioned and intersected by numerous canals, and is the great centre of the cheese industry. Steam tram takes the visitor all the way back from Edam to Amsterdam. The North Holland Tramway Company has arranged a specially conducted tour for this outing, leaving Amsterdam at 10 o'clock arriving back at 4.45 p.m., allowing half-an-hour at Broek and Monnikendam, an hour at Marken and Volendam, and 50 minutes at Edam. Saturday evening and Sunday morning can be spent in Amsterdam and Sunday afternoon and evening for visiting the Hague and Scheveningen. The return home is made by Sunday night's boat from the Hook and the week-ender is back in London at 8 o'clock on Monday morning.



GREAT CENTRAL RAILWAY CONTINENTAL ROYAL MAIL STEAMER *Bury*.

Belgium is a country full of interest. The cathedrals at Bruges, Ghent, Brussels and Antwerp are magnificent buildings and contain priceless treasures of painting and sculpture, while some of the municipal buildings are no less splendid. The sea-side resorts have unrivalled stretches of firm sands, and the Ardennes, composed of mountains and valleys, forests, rivers and brooks forms a miniature Switzerland. Add to these attractions the Battlefield of Waterloo, good golf clubs, the very cheap living, and

Digitized by Google

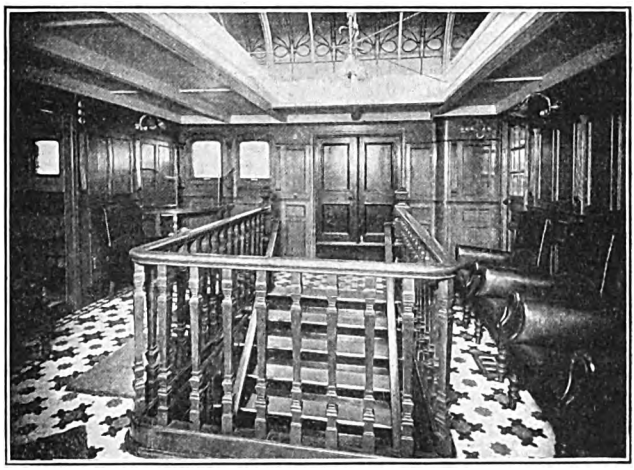
DOUBLE BERTH CABIN: GREAT CENTRAL RAILWAY CONTINENTAL STEAMER *Bury*.

the excellent transport facilities, and it is not hard to understand Belgium's popularity.

Circular tickets are issued embracing Holland and Belgium, allowing of the journey being made one way *viâ* the Hook of Holland, and the other way *viâ* Antwerp. To make the best of both routes a useful hint is to make the outward journey *viâ* Antwerp, other things being equal. The morning arrival at Antwerp is interesting by reason of the approach up the Scheldt.

The Great Central Railway has been the cynosure of interested regard lately in shipping circles owing to the great new docks opened by the Company at Immingham, six miles from Grimsby, up the Humber, an event of the first importance in relation to the phenomenal strides made during several decades past in the trade of the Humber and Grimsby especially.* Immingham Docks are the deepest on the East Coast, the water never being lower than 27½ ft., and the largest vessels can enter at absolutely any state of the tide, day or night. There is a large Graving Dock which can be used at any time independent of tides, with workshops and foundry adjoining; ships chandlers, ship store and provision merchants are established near the Lock Pit. The last thing in hoists, cranes, elevators, transit sheds, warehouses, bonded stores and granaries are provided, and from the all-round success of the venture it would seem that the promotors confidence has been more than justified. The P. & O. Line has sailings from Immingham to Malta, Suez, Egypt, India, Straits, China, Japan and Australia; the Glen Line to Egypt, China and Japan; the Wilson Line to Bombay and Karachi; and the Hamburg-American Line to the West Indies and South America. Other steamship lines are contemplating using Immingham in the near future. A very large coal exporting business has already been created, 2,314,644 tons of coal being shipped during 1913.

Numerous vessels quickly coaled has been the feature since the opening of the Dock, and records are being broken daily; the latest is that of the s.s. *Riding*, which loaded a full cargo of 1,722 tons of coal in 2 hours 55 minutes, or an average of over 590 tons per hour. This is a record for the whole of the Humber.



STAIRCASE AND LOUNGE: GREAT CENTRAL RAILWAY CONTINENTAL STEAMER *Bury*.

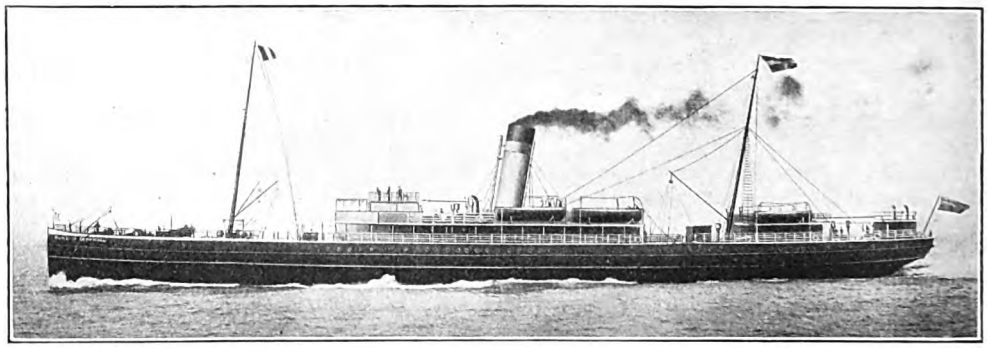
* A full description of Immingham Docks appeared in the RAILWAY MAGAZINE for September, 1912.

Digitized by Google

Immingham Dock is the ideal wool port, and a great expansion is expected in this respect. A warehouse to accommodate no less than 40,000 bales of wool has been erected, and several large liners have discharged wool here. One vessel, the s.s. *Arrino* discharged 5,257 bales of wool in 8 hours, or at the rate of nearly 660 bales per hour.

For nearly half a century the Great Central Company has been engaged in the passenger Continental service by means of its own steamers sailing from and to Grimsby and the ports of Hamburg, Rotterdam and Antwerp. The Hamburg sailings were inaugurated in 1852 (daily sailings in 1891), the Rotterdam sailings in 1866, and the Antwerp sailings in 1867. For traffic from and *viâ* the Metropolis and the South of England to the Continent the Grimsby route can scarcely be considered a serious competitor with the services from more southerly ports, but Grimsby's central position and first-rate railway connections draw traffic from the Midlands and the North, especially for Germany. The Hamburg service is the most important of the Great Central Company's steamer connections with the Continent, a departure from each side of the North Sea being maintained every week-day evening. The geographical position of Grimsby and the trunk lines of railway converging there from Lancashire, Yorkshire, the Midlands and London render it unnecessary to time the departure of the boats from Grimsby with the running of one particular boat train, and trains are run serving all parts to connect with the sailings, the boats leaving after the arrival of the 3.20 p.m. boat express from Manchester (Central) and the 12.15 p.m. train from London (Marylebone). The Manchester train serves Sheffield, Worksop, Retford, Gainsboro' and Brigg, and a connecting train leaves (Liverpool Central) at 2.30 p.m. The London train picks up passengers at Rugby, Leicester, Loughboro' and Nottingham. The boat should berth at Hamburg (Sandthor Quay) at 4 a.m. on the second morning after departure after steaming 375 miles across the North Sea, giving passengers quite a respectable sea voyage. In the reverse direction the steamer leaves Hamburg at 9 p.m. (German time) and is due at Grimsby about 5 a.m. the second morning after.

As would be expected the railway arrangements from Germany's big port are capital; through carriages are worked between Hamburg and all principal stations in Germany, and through third class carriages run between Hamburg and Bale, Berlin, Cassel, Hanover,



TWIN SCREW STEAMER *Duke of Cornwall*: HULL AND ZEEBRUGGE STEAMSHIP SERVICE.

Mannheim, Dusseldorf, Cologne, Cuxhaven, Dresden, Munster, Elberfeld, Erfurt, Frankfort, Magdeburg, Leipsic, Mayence, Munich, Nurnburg, Stettin, Wurzburg, etc.

The Great Central was the first English railway company to make inclusive arrangements for German tourists visiting England; and the schemes so far carried out have proved most successful. Special booklets have been prepared, printed in German, and giving details of tours covering boat and English railway travel, hotel accommodation, motor drives, etc.

Sailings between Grimsby and the Dutch port of Rotterdam for cargo only are thrice weekly, on Tuesday, Thursday and Saturday evenings each way.

The Antwerp boat sails three times a week, leaving Grimsby on Monday, Wednesday and Saturday evenings, and arriving at Antwerp about 4 p.m. the next day. The time of

Digitized by Google

departure from Antwerp is 7 p.m. on Tuesday, Thursday and Saturday, a boat train leaving Brussels at 5.33 p.m., and the steamer should reach Grimsby about 3 p.m. the following day. The distance between Grimsby and Antwerp is 250 miles, the passage taking roughly 20 hours to make.

The following table gives the cost of the saloon fares compared with the sea mileage from Grimsby to each port :—

SINGLE.

Grimsby to	Saloon Fare.	Miles.	Rate per mile.
Hamburg ..	30/-	375	.96d.
Antwerp ..	15/-	250	.74d.
	RETURN.		
Hamburg ..	40/-	750	.64d.
Antwerp ..	20/-	500	.48d.

For saloon travel on first-class ships the fares as disclosed by these figures are remarkably cheap—the first-class return fare between Grimsby and Antwerp is less than a halfpenny a mile !

At the present time the Great Central Railway has a fleet of 15 well-equipped and appointed steamers. The *Dewsbury, Accrington, Bury* and *Stockport* are engaged on the Hamburg service. They are new screw boats of 1,700 tons with engines of 2,000 indicated horse-power, capable of steaming 14 knots an hour, and in their design particular attention has been given to providing for the comfort and ease of passengers. All the saloon accommodation is placed amidships, and the deck cabins, of which there are sixteen on the bridge deck, are entered from the main saloon entrance and not from the promenade deck. The sister ships *Marylebone* and *Immingham* which also sail to Hamburg, are the Company's largest boats, having a tonnage of 2,000 and engines of 2,100 indicated horse-power with a speed of 14 knots an hour. The older ships of the line, varying from 1,100 to 1,400 tons, and speeds of 13 to 14 knots an hour, perform the Rotterdam and Antwerp sailings. All the vessels are lighted by electricity, and by keeping the catering on board under its own control the Great Central Company endeavours to secure that the motto " comfort " is deserved all round.

Arrangements have also been made by the Great Central Railway for the issue of through tickets, single and return, to the following towns in Germany, and passengers travelling by the Grimsby-Hamburg route are thereby saved the trouble of having to rebook after leaving England : Berlin, Bremen, Breslau, Dresden, Frankfurt-on-M., Hanover, Kiel, Leipsic, Lubeck, Magdeburg, Munich, Nuremburg, Rostock, Schwerin and Stettin passengers can also have their luggage registered through between Grimsby Docks and the German towns named.

Great Central Railway interpreters in uniform attend the arrival and departure of the steamers at Grimsby, Hamburg, and Antwerp, in order to give passengers any information and assistance they may desire free of charge. They will also despatch letters and telegrams on passengers handing to them the messages and the amount payable to the postal authorities.

Like the Great Eastern Company from Harwich, the Great Central Railway serves the steamers of shipping lines from Grimsby to Denmark, Norway and Sweden as tabled below :—

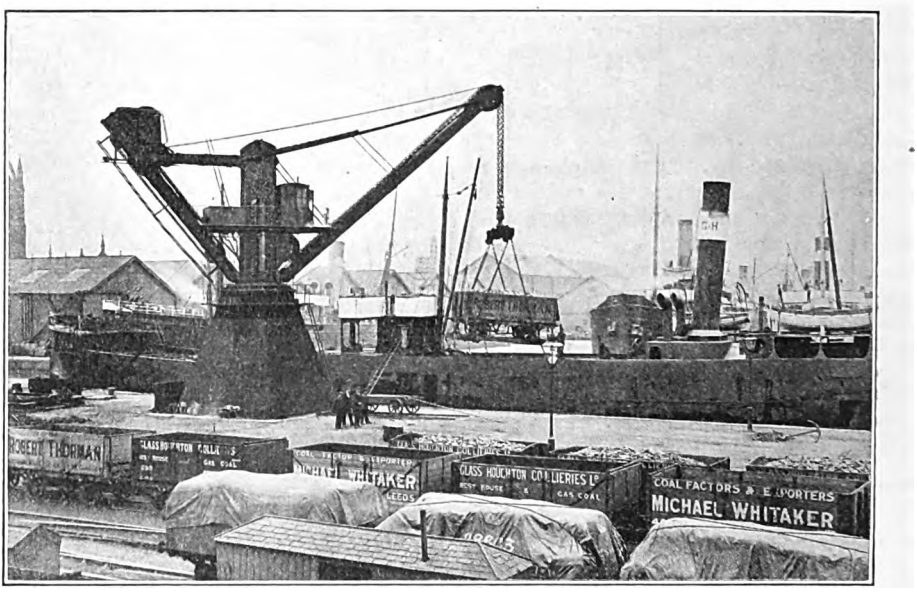
PORT.	From Grimsby.	To Grimsby.	Average Passage.
Esbjerg	Mondays, Thursdays (about 7.0 p.m.)	Tuesdays (about 12 noon) Fridays (about 6.0 p.m.)	30 hours.
Gothenburg	Every Saturday (about 7.0 p.m.)	Every Wednesday (9.0 a.m.)	36 hours.
Christiania (Calling at Christiansand)	Every Tuesday Evening.	Every Saturday (about 5.0 p.m.)	48 hours.
Malmo	Every Tuesday.	Every Thursday Afternoon.	50 hours.

All the steamers plying between Grimsby and the Continent bring large quantities of merchandise into England, and there is a steady flow of traffic between the Continent and America *viâ* Grimsby and Liverpool, the rail transit across England taking the place of the sea passage round the Foreland and through the English Channel. For North Germany, which is rich in the attractions of quaint and interesting old cities and picturesque scenery, the Great Central Company offers to holiday-makers a most

Digitized by Google

comprehensive and economical series of tours, covering Hamburg, Berlin, Lubeck, Hanover, etc. There are also tours to Belgium including Antwerp, Brussels and Ghent. To Hamburg and Antwerp return tickets, valid for 45 days, are issued at lower fares than the ordinary return tickets which are valid for six months, and on three days a week still cheaper return tickets are issued valid for a fortnight. Return tickets to Hamburg can be used to return from Antwerp, and on payment of a supplementary fee return tickets to Antwerp can be used from Hamburg.

The third railway East Coast Continental route is worked by Lancashire and Yorkjointly with the North Eastern Railway Company from Hull to Zeebrugge, and makes a comfortable and very inexpensive route from the north to Belgium, and Central Europe accessible through Belgium. From the North Eastern Railway's Riverside Quay at Hull the steamer leaves at 5.50 p.m. on Tuesday, Thursday and Saturday, arriving at Zeebrugge Quay early the next morning. A special express train awaits the arrival of the steamer at Zeebrugge Quay and runs direct to Brussels *viâ* Bruges and Ghent, connecting with trains for all parts of Belgium and important towns in Germany and Switzerland, including Luxemburg, Aix-la-Chapelle, Cologne,



STANHOPE DOCK, GOOLE, SHOWING 50 TON HYDRAULIC CRADLE CRANE.

shire Railway vessels, and provides steamer connections with France, Belgium, Holland, Germany and Denmark. The services in the main are merchandise services, although all boats carry passengers. It is only eleven years ago that the Lancashire and Yorkshire Company secured powers to establish steamer services to the Continent, and powers having been obtained, the fleet of the Goole Steam Shipping Company was purchased; in May, 1906, the vessels of the Co-operative Wholesale Society, plying between Goole and Hamburg were acquired. The principal passenger service, which was inaugurated in June, 1906, operates for the holiday months June to September, and is worked

Berlin, Frankfort, Hanover, Bale, Lucerne and Lausanne. For the crossing from Belgium a boat train leaves Brussels at 3.52 p.m. calling at Alost, Ghent and Bruges for the boat sailing from Zeebrugge Quay at 6.15 p.m. on Sunday, Wednesday and Friday arriving at Hull the following morning. The co-operation of the Lancashire and Yorkshire and North Eastern Railways supplies fast train connections between all the large towns of Lancashire, Yorkshire, Northumberland and Durham and Hull for the departure and arrival of the Zeebrugge steamer. A through boat train to Riverside Quay runs from Liverpool, Manchester, Brighouse and Wakefield, and through

Digitized by Google

corridor carriages work from many of the large towns in Lancashire and Yorkshire to Hull to connect with the boat.

The Zeebrugge steamer is convenient for people from the north and midlands of England travelling to the seaside resorts on the Belgium Coast, the Coast watering places between Ostend and Knocke being served by electric trams passing through Zeebrugge. Heyst, Knocke and Le Zout are quiet, without being slow, places drawing a number of English visitors in the summer, and Blankenberghe, which from point of size ranks second to Ostend among the score of holiday places on the Belgian coast is reached in a quarter-of-an-hour by electric tram from Zeebrugge. Between Blankenberghe and Ostend are Wenduyne and Le Coq-sur-Mer which owns an 18-hole golf course provided by the late King Leopold. West of brilliant Ostend, and linked by tram and light railway lie Middlekerke, Westende, Nieuport Bains and La Panne and then comes the French frontier.

The trade of Goole is varied, the exports including coal from the South and West Yorkshire coal-fields, manufactured goods from Lancashire and Yorkshire, and machinery from various parts of the country. Butter and dairy produce, fruit and perishable traffic is imported, and during the summer months the vessels homeward bound call at Hull with fruit, etc., for the local market.

The Lancashire and Yorkshire Company is the largest owner of steamers among British Railways, and could justly and appropriately add the words "and steamship" after railway in its title. In addition to the Hull and Zeebrugge service worked jointly with the North Eastern Railway, no fewer than nine services are regularly in operation with Continental ports from Goole. Steamer sailings are maintained as set out in the following table :—

Port.	From Goole.	To Goole.
Amsterdam.	Wednesday and Saturday.	Tuesday and Saturday.
Antwerp.	Monday, Wednesday, and Saturday.	Tuesday, Thursday, and Saturday.
Copenhagen.	Wednesday.	Thursday.
Delfziel.	Tuesday.	Saturday.
Dunkirk.	Tuesday.	Saturday.
Ghent (Direct).	Wednesday and Saturday.	Wednesday and Saturday.
Hamburg.	Monday, Wednesday, Thursday, and Saturday.	Monday, Wednesday, Friday, and Saturday.
Rotterdam.	Monday, Wednesday, and Saturday.	Tuesday, Thursday, and Saturday.

The large and growing trade of Goole with Continental ports has necessitated the dock accommodation being considerably enlarged and improved, and the docks and quays are well equipped with bridges, coal-tips, hydraulic cranes, etc., and there is ample provision in the way of sheds, warehouses and vaults for storing all kinds of goods.

The writer desires to acknowledge his indebtedness for information supplied for this series of articles to Mr. J. Avis, Continental Traffic Manager, S. E. & C. Rly.; Mr. T. N. Wylie, Continental Traffic Manager, L. B. & S. C. Rly.; Mr. C. Busk, Continental Traffic Manager, G. E. Rly.; Mr. T. M. Williams, Marine and Dock Superintendent, L. & S. W. Rly.; Mr. F. Barwick, Steamship Superintendent, G. C. Rly.; and Mr. H. Marriott, Chief Goods Manager, L. & Y. Rly., and other officers of the respective railways.

Digitized by Google

The King George Dock at Hull.

ON Friday, June 26th, His Majesty, King George V., accompanied by Queen Mary, formally opened the new dock constructed at Hull jointly by the North Eastern and Hull and Barnsley Railways; and the enterprise, referred to for the time being as the new Joint Dock, is now to be known as the King George Dock.

Hull occupies the third place in the United Kingdom as a "Coal" port, pure and simple, as well as from the standpoint of general trade. It has railway access to about 400 collieries and is the nearest of the larger ports of the United Kingdom to the great coalfields of Yorkshire, Nottinghamshire and Derbyshire, which yield annually about 70,000,000 tons of coal. In all there are 40 separate coaling berths at the Hull docks, with a total maximum shipping capacity of no less than 15,000 tons per hour, some of the appliances being capable of shipping up to 800 tons per hour each, from which it will be gathered that Hull, the natural outlet for the coalfields named above, affords adequate facilities for the expeditious handling of the huge tonnage shipped from the port, which now reaches 7,000,000 tons per annum.

Hull, by means of exceptionally attractive port rates, combined with relatively low transport rates which are in the main lower than those charged to or from London or Liverpool, serves an area inhabited by 11,000,000 people, or, roughly, one-fourth of the entire population of the United Kingdom.

The town occupies an unique position for catering for the enormous trade between this country and the Continent, being the natural gateway for traffic passing from and to the thickly populated industrial centres of the Northern Counties and the Midlands. There are no less than 43 steamers leaving Hull every week for the near Continent, calling at 60 different ports, and a similar service is given in the homeward direction. Special facilities are provided for expeditiously dealing with large quantities of fruit, provisions and other perishable traffic at the riverside quays of the two companies alongside which vessels engaged in these trades can come at any state of the tide.

There are now ten railway-owned docks at Hull, with a water area of 158 acres; two river piers with a quay length of 3,850 ft.; 101 cranes, the largest with a lifting capacity of 100 tons; 34 coaling appliances, capable of shipping 9,980 tons of coal per hour; 51 warehouses with a storage capacity of 138,150 tons; 890,000 cubic ft. of cold storage space; and 340 acres of open storage ground.

To this accommodation is now added the equipment of the new enterprise, the largest dock on the north-east coast, and capable of receiving vessels of any size coming to northern ports. There is a water area of 53 acres, with provision for extension to 85 acres; length of quays is 8,162 ft.; the main basin is 1,050 ft. by 1,000 ft.—so that the largest vessels can manœuvre and leave bow foremost; the entrance lock is 750 ft. long and 85 ft. wide; at high water or spring tides there is a depth over sills of 42 ft. 3½ in. (outer) and 39 ft. 3½ in. (inner), and in the dock itself 38 ft. and a minimum of 31 ft. 8 in.

The new dock is situated to the eastward of the series of docks which at present extend along the river frontage of Hull for a distance of nearly four miles, and adjoins the Hull and Barnsley Company's Alexandra Dock, which was opened for traffic in 1885. The greater part of the site of the new dock is on the foreshore of the Humber and outside the old Humber protection bank which roughly coincided with the new north quay wall.

Access to the dock is given by an entrance lock, 750 ft. long, and 85 ft. in width, leading out of the south-west corner of the central basin, and pointing up stream. The lock is divided into two pens by three pairs of gates, the inner pen being 250 ft. and the outer pen 500 ft. in length. Timber jetties are provided on each side of the entrance to the lock for vessels to lie against before being warped into the lock. A fan-shaped channel has been dredged from the lock extending for about 320 yards into the river, measured from the general frontage line of the river embankment, and this will be maintained 1 foot below the outer sill, giving a depth of 21 ft. at low water ordinary spring

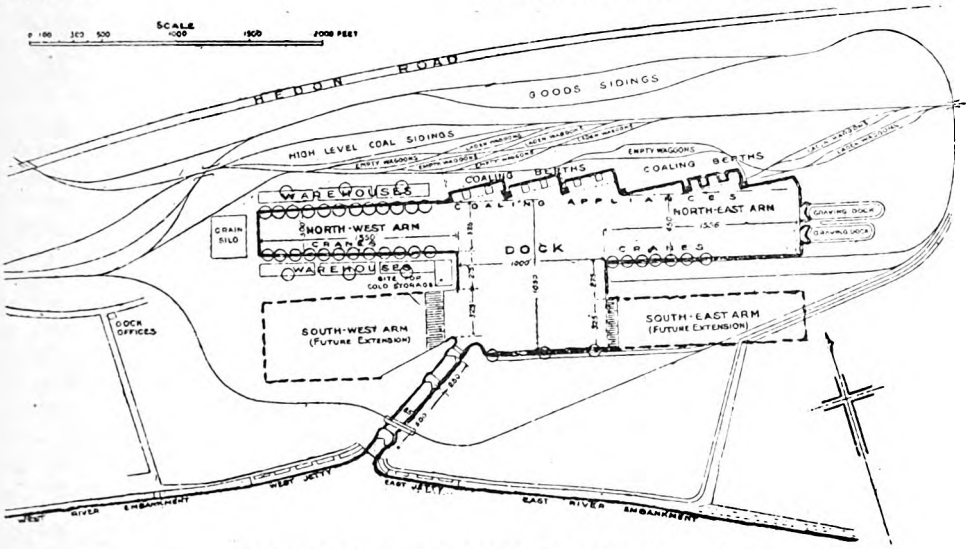
Digitized by Google

tides. Dock walls are constructed on three sides of the north-west arm, and on the south and west sides of the central basin, but owing to the unsatisfactory foundations, timber wharfing with a stone-faced slope behind was substituted along the south side of the north-east arm.

The north sides of the central basin and the north-east arm will be used entirely for the shipment of coal, and here a series of concrete piers with stone-pitched slopes between, have been constructed in such a way that ships can lie in "echelon." Short timber jetties have also been provided to prevent vessels from touching the sloping walls, and suitable timber dolphins erected to separate the vessels where they overlap each other.

ton electric travelling cranes are provided on the roofs of these warehouses, and by means of these, goods can be lowered into railway wagons at the quay level.

At the western end of the north-west arm a ferro-concrete grain silo of 40,000 tons capacity is in course of construction, and this will consist of two large blocks each containing 144 bins. A complete system of band conveyors, elevators, automatic weighing machines, etc., will be installed, and ferro-concrete conveyor tunnels have already been constructed along the north and south quays. Portable elevators will be provided on these quays, and when the whole installation is completed, it will be possible to discharge four grain ships simultaneously, and also to deliver from the silo into lighter,



PLAN OF THE KING GEORGE DOCK, HULL.

At the eastern end of the north-east arm two graving docks have been constructed wholly of concrete, each having a minimum depth of water on the sill of 22 ft. The dimensions are 550 ft. by 72 feet, and 450 ft. by 66 ft. respectively.

Capacious ferro-concrete warehouses have been constructed, occupying practically the whole length of the quays on each side of the north-west arm of the dock. Those on the north side are in three blocks, each 375 ft. by 90 ft., and are single storey warehouses, and those on the south side are two-storey buildings, also built in three blocks, each 375 ft. by 70 ft. All these warehouses have flat asphalted roofs which can be used for storage of goods, and they are connected at the floor and roof levels by bridges; 1½-

for which purpose special conveyors and spouts will be provided at the west end of the arm.

A very complete equipment of electric cranes is being provided, the particulars of which are as follows:—

The quay cranes all travel on rails having a gauge of 15 ft., and have luffing jibs, giving a horizontal movement to the load. Of this type there are thirty 3-ton, four 7-ton, and nine 10-ton cranes, and six of the latter are fitted with portable elevators for discharging grain. On the roofs of the warehouses there are nine 1½-ton travelling cranes, also fitted with special luffing gear. A self-propelling floating crane of 80 tons capacity is also available for use when required.

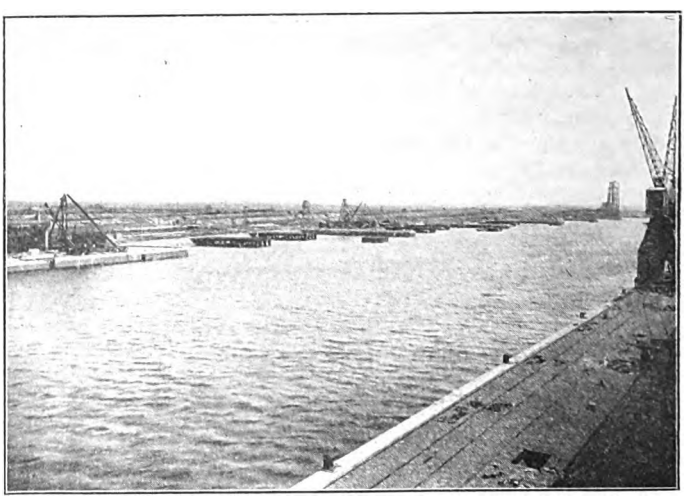
Digitized by Google

Photochrom Co., Ltd. [*London.*

SITE OF HULL JOINT DOCK.

Twenty-five of these cranes were supplied by Messrs. Royce, Limited, of Manchester. They are of the travelling gantry or portal type on four of the quays, each of 3 tons capacity, the general design of which is shewn by the accompanying illustration. The cranes are fitted with the Musker-Davidson Patent Balanced Luffing Gear, and the motions of hoisting, travelling, luffing and slewing are electrically driven. The maximum radius of the jib is 50 ft., minimum 20 ft., the luffing speed at the hook 150 ft. per minute. The hoisting speed with 3 tons is 150 ft. per minute, 1½ tons 250 ft. per minute. Slewing speed at hook 400 ft. per minute, travelling speed 30 ft. per minute. The height from crane rails to the point of the jib at maximum radius is 80 ft. The electrical equipment is made for 440 volts direct current. The hoisting motor is of 45 b.h.p., slewing 5 b.h.p., luffing and travelling each 8 b.h.p. The electrical gear is of "Royce" manufacture throughout. The motors are of the totally enclosed type, six hours rating. The controllers are of the tramway type, of exceptionally robust construction to stand heavy usage. The travelling rail centres are 15 ft. and the wheel base 19 ft. For a test of stability the cranes were subjected to a load of 6 tons on the hook at the extreme radius in any position of the jib without any support from jacks or rail clips, and withstood the test successfully, there being no indication of the slightest lift on the structure or wheels.

Each crane is supported on four cast steel travelling wheels with single flanges on the inside. The travelling motion only is fitted with hand gear. Automatic electrical safeguards against over-running in either direction are provided for the hoisting and luffing motions. All the toothed gears on the crane (except motor pinions, which are of raw hide) are of cast steel, machine cut throughout. Each motion is fitted with an electrical brake, and in the case of the hoisting motion a powerful foot brake is also provided on the barrel shaft and is used for quick lowering without current. In such circumstances the electrical brake is held off by a hand-release device. The gear for the motions of hoisting, slewing and luffing is carried on a central revolving mast which is pivotted and supported at the foot in a substantial cast steel footstep bearing, and at about the centre of its length by a roller path. The jib is carried at the top end of



Photochrom Co. [*London.*

COALING BERTHS, SHOWING ECHELON ARRANGEMENT.

Digitized by Google

the mast by a heavy fixed shaft and is balanced by weights fixed at the tail end of the jib structure.

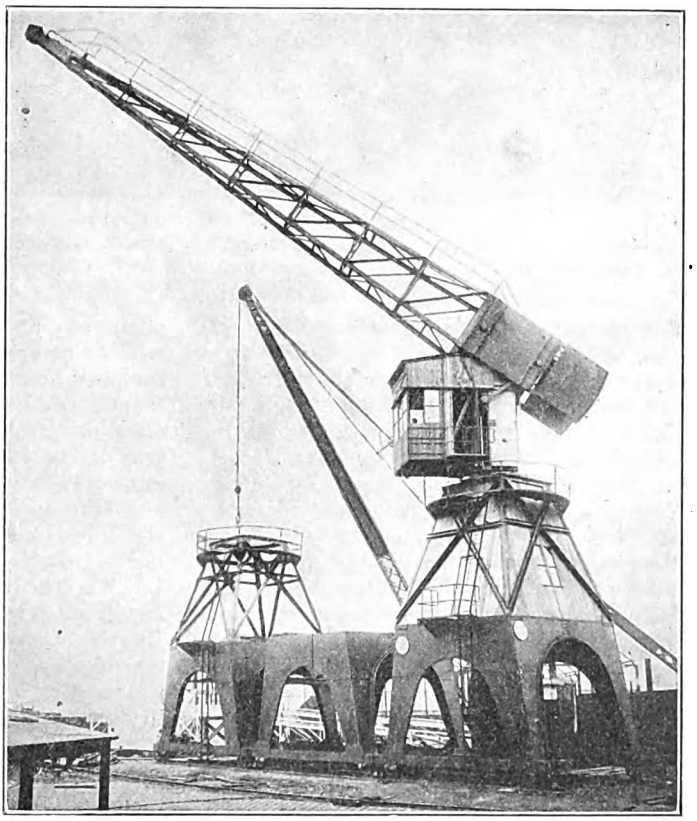
The special advantages of the luffing arrangements are that the load during luffing is not lifted as in the ordinary jib crane, but moves in a horizontal line and, consequently, a great saving of power is effected and a small motor only is required. In addition a quick luffing speed is permissible. The position of the crane driver, it will be seen, is one that enables him to command in his view the whole of the movements of the hook and load. Current is conveyed to the crane through heavily armoured cable from plug boxes fixed at intervals along the quays, and each crane is provided for this purpose with a revolving cable drum on one of the bottom carriages.

The coal shipping appliances are situated on the north side of the dock, and berths will ultimately be provided for about seven vessels. At present, two electrically-driven belt conveyors are being erected, each capable of loading at the rate of 800 tons per hour, and two hydraulic coal tips, each of a capacity of 500 tons per hour. One of these coal tips is movable, and can be worked in conjunction with the fixed coal tip, so that when necessary both can be used for the loading of one vessel, or they can be used independently for loading ships of the usual collier class. Both conveyors and coal tips are constructed with a lift of sufficient height to enable the largest vessels to be loaded or bunkered.

In connection with these coal shipping appliances, a very complete system of high and low level sidings has been provided which will enable full advantage to be taken of gravitation working, and each conveyor or coal tip will have its separate set of sidings for loaded and empty wagons. Additional coaling appliances will be erected on the foundations already constructed when it is necessary to provide for increased traffic.

Electric power is used for every purpose on the dock, except that hydraulic power is employed for operating the lock and graving dock gates, and for the hydraulic coal tips, and for this purpose powerful electrically-driven pressure pumps have been installed.

The whole of the work has been constructed under the direct supervision of the engineers of the two railway companies: Mr. T. M. Newell and Mr. R. Pawley, who were appointed joint engineers by the Hull Joint Dock Committee. Mr. W. Ebdon has acted as Resident Engineer, and Mr. T. L. Norfolk has superintended the construction of the equipment. The new dock offices and other buildings of an architectural character have been designed and erected under the supervision of Mr. W. Bell, architect to the North Eastern Railway. The general contractors for the dock are Messrs. S. Pearson



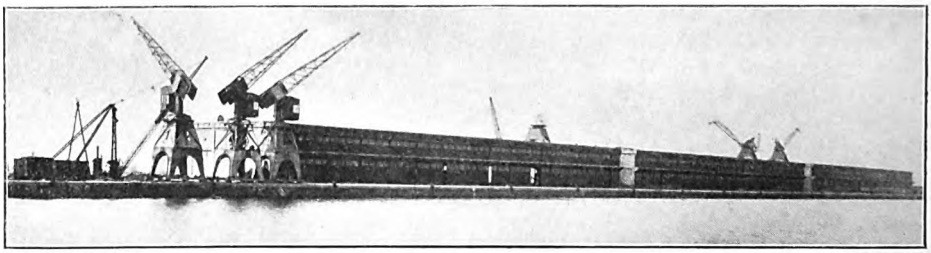
ROYCE 3-TON ELECTRIC CRANES FOR USE IN THE KING GEORGE DOCK, HULL.
Shown in course of erection in the makers' yard.

Digitized by Google

& Son, Ltd., of Westminster, and the works have been carried out under the personal direction of Mr. F. T. Hopkinson, one of the directors of that firm.

Another addition by the Hull and Barnsley and North Eastern Railway Companies to the facilities of the port is the Salt End Oil Jetty. This jetty, which has just been completed, extends into the River Humber for 1,500 ft., and having a depth of 30 ft. of water L.W.O.S.T., the largest vessels can come alongside at any state of the tide and discharge direct to storage tank through pipe lines laid along the jetty. A large area of land has been set apart for the erection of these oil, etc., storage tanks, and the establishment of allied industries, several of the largest oil firms having already taken sites and commenced operations.

For the opening ceremony exceptionally satisfactory arrangements were made, notwithstanding that it involved catering for guests on a scale never before attempted.



Photochrom Co.] *[London.*

FERRO-CONCRETE WAREHOUSES, NO. 3 QUAY.

For the conveyance of nearly 2,000 guests nine special trains were run direct to a temporary station erected on the north side of the warehouses on No. 1 Quay. There were three trains from London (one serving Grantham, Newark, Doncaster, and Goole); one train from Birmingham, serving Burton, Derby, Chesterfield, Sheffield and Cudworth; one train from Liverpool, serving Manchester, Rochdale, Mirfield and Wakefield; one train from Bradford, serving Leeds and Selby; one train from Newcastle-Darlington, and carrying Scotch guests; one train from Sunderland, serving West Hartlepool, Stockton, Middlesbro', Northallerton, Thirsk and York; and one train from Willerby. Guests coming from a distance were served with breakfast on the outward and dinner on the return journey. In addition, special trains were run to convey the catering staff, military, bandsmen and others, making a total of 16 special trains run in connection with the ceremony. Thirteen different kinds of special railway tickets had to be printed.

Most of these trains were made up of the largest and newest first-class dining cars and saloons, and were brought, for the most part, by North Eastern 4–6–0 locomotives as regards journeys over the North Eastern system, though the Midland train was worked by a Hull and Barnsley locomotive. Weather was at its very best, and the view of the decorated warehouses and cranes, and warships and destroyers in the basin constituted a scene which will linger long in the memory of those privileged to be present. And from our seat immediately in rear of the royal daïs the scarlet coats of the bandsmen, flanked on either side by the white frocks of the lady members of the choir situated on the opposite side of the basin, provided an effective centre piece.

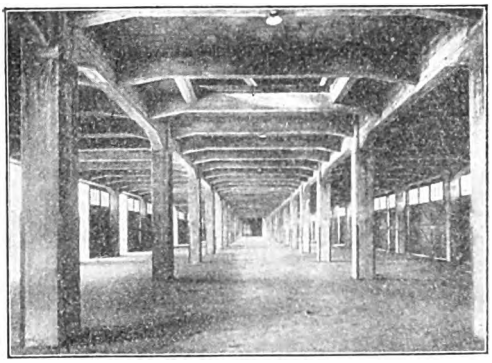
The royal train, worked by North Eastern locomotive No. 2164, a new 3-cylinder simple superheater "Atlantic," arrived punctually at the Paragon station, and after various ceremonies in Hull, their Majesties travelled by motor-cars to the entrance lock, thence travelling on the Trinity yacht *Irene* on what is probably the shortest voyage they have ever undertaken, and landing immediately in front of the royal daïs.

At the dock, Sir Hugh Bell, Chairman of the Joint Dock Committee, read the following address:—

"We, the Committee appointed by the North Eastern and the Hull and Barnsley Railway Companies for the construction and management of their joint undertaking which your Majesties have been graciously pleased to visit to-day, humbly desire to express our grateful sense of the favour shown to us, and to assure your Majesties of our deep loyalty and affection. Among the many Royal privileges granted to the inhabitants of Hull (the third port in the United Kingdom) since it was created a Royal borough by King Edward I., we recall

Digitized by Google

Digitized by Google



Photochrom Co.] [*London.*

INTERIOR OF FERRO-CONCRETE WAREHOUSE.

glad to be with you to-day on an occasion of such good omen, not only for the development of the city and the surrounding district, but also for the strengthening of the peaceful ties which link our lands to the Dominion across the seas, and to the great nations of the world. We thank you for your good wishes, and we look forward with every confidence to the further expansion of your useful labours and the prosperity of your city."

Sir Hugh Bell again stepped forward and, addressing her Majesty the Queen, said: "Your Majesty has graciously permitted us to offer you a memento of a personal character of your visit here to-day. It consists of a table service of old English silver. We would desire to connect this gift directly with this dock, in that through it large quantities of foodstuffs will be conveyed to the toiling masses of your subjects, in whom, as we all know, your Majesties have ever taken a great interest."

Sir Hugh Bell then called upon Miss Wright, daughter of Sir Wm. Wright, Chairman of the Hull and Barnsley Railway, to hand over the gift, and this that lady did most gracefully. Her Majesty smilingly acknowledged the gift, and later expressed her great pleasure at receiving such an unique memento.

The luncheon was served on the first floor of warehouses 4 and 6 on No. 3 quay of the Joint Dock—the first floor of the centre warehouse No. 5 being given up entirely to the caterers' staff. A van load of flowers was brought from London for decoration of the tables, and a carriage truck full of plate. Light refreshments were supplied on the roof of No. 5 warehouse by Messrs. Lyons. Those at other points of the dock were provided by Messrs. Polowny's and the Hull People's Café Company, under the direction of Mr Gent, the North Eastern Railway hotels superintendent. The decorations were carried out by Messrs. Pain and Sons, under the control of the North Eastern Railway Company's architect.

Apart from the general public, nearly 14,000 guests were invited to view the ceremony, viz.: 3,900 guests to seats around the royal daïs and to luncheon afterwards; 1,000 guests to the roofs of Nos. 4, 5 and 6 warehouses, for whom light refreshments were provided; 2,000 guests to grand stands on No. 3 quay; and 7,000 guests to the warehouses and front of No. 1 quay.

Lord Knaresborough, Chairman of the North Eastern Railway Company, presided at the luncheon in No. 4 Warehouse. The Lord Mayor of Hull proposed the toast of the new dock. The Hon. Guy Wilson, M.P., supported the toast, and Sir Hugh Bell returned thanks. In No. 6 Warehouse Sir W. S. Wright, Chairman of the Hull and Barnsley Railway Company, presided, Lord Nunburnholme proposed the toast "Success to the New Dock," Sir Mark Sykes, M.P., supported it, and the Chairman responded. In all cases the speeches were brief but expressed optimistic sentiments, and the toasts were enthusiastically honoured.

The visitors then inspected various parts of the dock and the special trains were despatched one after the other from the temporary station with almost absolute punctuality. We may conclude this brief review of the proceedings of an eventful day by quoting a letter received by Sir Hugh Bell a day or two after on behalf of their Majesties:—"Dear Sir Hugh,—The King desires me to express to you and to all those responsible for the arrangements their Majesties' thanks for the successful way in which the ceremonies at the opening of the Hull Joint Dock were organised and carried out. The function passed off in a manner which proved that the greatest care and forethought had been exercised. The arrangements were excellent, particularly in that they gave an opportunity of realising the importance of the great undertaking which has been brought to a satisfactory issue. Their Majesties were glad to be present on so important an occasion in the history of the port, which cannot fail, with all these new improvements, to assist the prosperity of Hull and of the railway companies concerned. Believe me, yours sincerely, BEAUCHAMP."

Digitized by Google

Opening of the New Lock Entrance: Alexandra Docks, Newport.

THE Alexandra (Newport and South Wales) Docks and Railway Company was incorporated in 1865 under the title of the "Alexandra (Newport) Dock Company," with a capital of £800,000. By act of 1882 the name was changed to "The Alexandra (Newport and South Wales) Docks and Railway Company," and the capital, including all classes, now amounts to £4,093,750. Capital expenditure at the 31st December, 1913, amounted to over 3½ million pounds, of which nearly two million pounds have been spent upon works carried out during the last 13 years.

Newport is situated at the mouth of the deepest tidal river in Great Britain, and is at the edge of the greatest coalfield in the world. It is a busy centre, rapidly increasing, and the annual shipment of coal is close upon 6,000,000 tons, the bulk of which is dealt with at the Alexandra Company's docks. There is also a large business in general imports and exports, and the total tonnage, other than coal, approximates 2,000,000 tons per annum.

The Town Dock, with a deep water area of 11½ acres is the oldest wet dock in Newport. There are four coal hoists, a number of hydraulic cranes for general cargo, a timber slip, and warehouses.

Alexandra North Dock (28¾ acres), was constructed under powers of 1865, opened in April, 1875, and named "Alexandra" after Queen Alexandra. Its length is 2,500 ft.; width, 500 ft.; average depth of water in dock, 30 ft. The entrance lock is 350 ft. long and 65 ft. wide at cope level. There is quayage of 5,696 ft. The junction between the North and South Dock is 60 ft. wide. On the west side there are 9 hydraulic coal hoists and on the east side 19 hydraulic cranes for dealing with general cargo, and two large warehouses.

Alexandra South Dock (20 acres), was constructed under powers of 1882, and opened in June, 1893. Its length is 1,500 ft.; width, 640 ft.; quayage, 3,740 ft.; average depth of water, 30 ft. The entrance lock is 503½ ft. long and 72 ft. wide at cope level. On the west side there are 4 hydraulic coal tips, and on the east side 8 powerful hydraulic cranes for dealing with the general cargo trade. The warehouse has a floor area of 12,000 sq. ft.

The South Dock Extension (75 acres), was constructed under powers obtained in 1904 and 1906. Forty-eight acres were brought into use in November, 1907. The construction of the dock necessitated a diversion of the River Ebbw for about half a mile. The length of the dock is 4,000 ft.; width, 1,000 ft.; quayage, 8,921 ft.; average depth of water at present, 33 ft., ultimately, 38 ft. The South Dock Extension and South Dock (which are for all practical purposes one dock) have a combined area of 95 acres, making this dock the largest single sheet of water held up by lock gates in the world. Equipment on the North Quay consists of four hydraulic coal tips, capable of shipping coal at the rate of 600 tons per hour. Height of lift above quay, 60 ft. Foundations for 3 more hoists are in course of construction. Two of the new hoists will have a lift of 70 ft. above quay level. On the South Quay there are twelve hydraulic cranes of 1½ to 6 tons lifting capacity. Eight additional cranes are in course of erection. At the east end of the quay is a brick warehouse, 500 ft. long and 100 ft. wide, and parallel with, and at the back of the quay, are several miles of sidings.

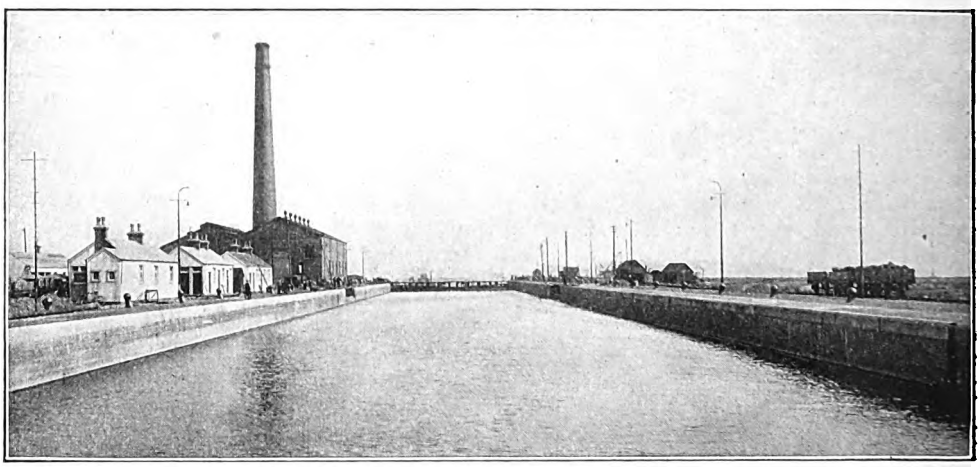
The new Lock Entrance opened on July 14th by H.R.H. Prince Arthur of Connaught, K.G., is a development of the South Dock Extension scheme already mentioned. The contract, together with that for a further 27 acres of the South Dock Extension, was let in December, 1906. The entrance lock is 1,000 ft. long by 100 ft. wide, and is divided by gates into two sections. The inner compartment (opening into dock), is 600 ft. long and the outer compartment (opening seawards), 400 ft. long. The timber jetties at the outer end of entrance are: Eastern Jetty, 500 ft. long; Western Jetty, 800 ft. long. There is a passenger steamer landing stage at the back of the Western Jetty. A site

Digitized by Google

for a new dry dock has been reserved on the west side of the lock, the entrance for which (100 ft. in width) has been formed in the wing wall at the inner end of the lock.

A large pumping and electric generating station is situated at the south-east end of the lock. It includes two main bays; the larger facing the lock side, forms the pump house and electric generating house; the smaller bay forms the boiler house. The chimney stack at the extreme south of building is 187 ft. high and 12 ft. 6 in. diameter at base, tapering to 7 ft. 9 in. at top. The pumping plant consists of two vertical three-crank condensing engines of marine type, 600–1,200 h.p. according to speed, and the engines are coupled direct to centrifugal pumps of the turbo type, which are 60 in. diameter, are amongst the largest of their kind in the Kingdom. They are so arranged that they will be available for pumping out the dry dock when constructed on the west side of the lock. Culverts have been provided from the pumps under the lock to the dry dock site for this purpose.

The electric generating plant consists of two 500 K.W. three-phase alternators, coupled direct to high-speed triple-expansion engines, and is used for lighting the Company's Docks and Railways. There is a large reserve output, which can be used for power purposes when required. Steam for the whole of the plant is obtained from a range of four boilers. Each boiler is 30 ft. long by 8 ft. in diameter, and the working

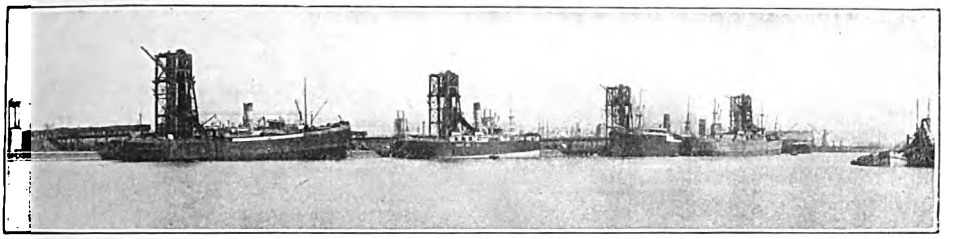


NEW LOCK ENTRANCE, FROM THE INNER GATES AND LOOKING SEAWARDS.

having a capacity of five million gallons per hour each. The pumps are at present used for pumping water from the River Usk into the dock in order to maintain a constant level in the dock. The two pumps, working together from 2½ hours before high water to 2½ hours after high water, would pump into the dock 50 million gallons of water, or sufficient to raise the level of the water in the entire dock system (including about 15 acres of timber float) 16 inches. The intake is in the north-east wing wall outside the outer gates, and the water is pumped into the dock through the delivery culvert, which runs parallel with the east side of the lock. The delivery culvert is constructed of cast-iron rings 12 ft. in diameter, practically the same size as one of the London tube railways. The pumps pressure is 180 lbs. per sq. in. The boilers are fitted with superheaters, and are mechanically stoked, the coal handling plant being electrically driven.

The bottom width of the new channel is about 650 ft. at its narrowest part, widening to about 900 ft. opposite the piers and 800 ft. at the seaward end. The length of the Channel between the new Entrance Lock and the limits of the Harbour Commissioner's jurisdiction is approximately two statute miles. About 2,000,000 hopper tons of material were removed in the course of the deepening and widening of the channel. This channel which follows in the main the natural deep water channel, is slightly curved at the inner and outer ends, and will be lighted on the west side by can-shaped buoys painted black and exhibiting

Digitized by Google



SOUTH DOCK EXTENSION, SHOWING FOUR COAL HOISTS IN OPERATION.

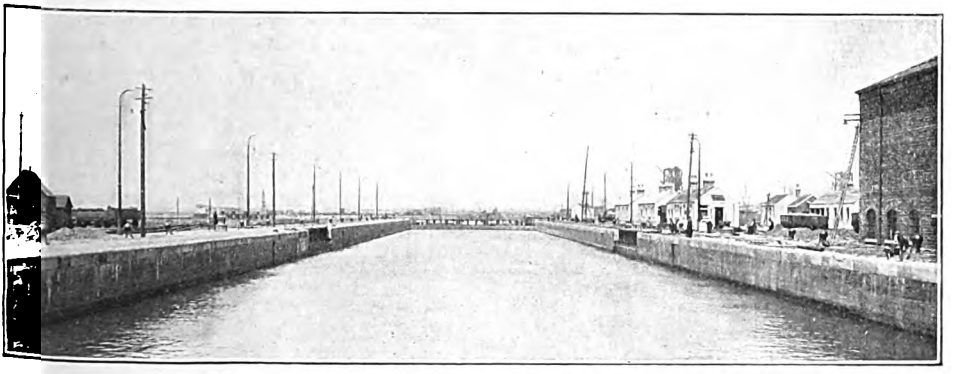
a red flash light, and on the east side by conical-shaped buoys, painted red and exhibiting a white flash light. The width of the estuary at high water springs abreast of the new Lock is nearly 2,000 ft.

Special trains were run for the opening ceremony and taken direct into the docks, two temporary platforms being erected, one for arrival, near the stands for visitors, and the other for departure, adjacent to the warehouse used for the luncheon. H.R.H. Prince Arthur of Connaught arrived by sea at the new lock entrance, travelling on Lord Tredegar's splendid yacht *Liberty*, which proceeded to its assigned position, breaking a ribbon stretched across. Simultaneously the band of the 1st Battalion Monmouthshire Regiment (I.) played the national anthem. The yacht was then moored opposite the power station and the water in the lock raised sufficiently to bring the promenade deck level with the coping.

Sir Henry Mather Jackson, Bart., then presented the Directors of the Company, Mr. J. H. Vickery, General Manager, and others, an address from the Corporation of Newport was presented by the Mayor and read by the Town Clerk, and various other presentations were made and addresses read. His Royal Highness then declared the new lock open, and a royal salute was fired by the 1st Battery of the 4th Welsh Brigade, R.F.A. (T.). The Prince then disembarked and inspected the Guard of Honour and the new pumping and power station, afterwards re-embarking on board the yacht. An electrical signal was then pressed and the inner lock gates opened, allowing the vessel to pass into the dock and proceed round the south dock and moor opposite No. 2 warehouse.

His Royal Highness was the guest of honour at a luncheon, presided over by Sir Henry Mather Jackson, at which there were present Lord Tredegar, the Hon. Evan Morgan, the Bishop of Llandaff, Captain the Hon. M. Ponsonby (in attendance upon the Prince), Major-General Sir Ivor Herbert, Viscount Churchill (Chairman of the Great Western Railway Company), together with nearly 1,000 guests, including the Press, and representatives of other railways, the local coalfields, shipping bodies, and others.

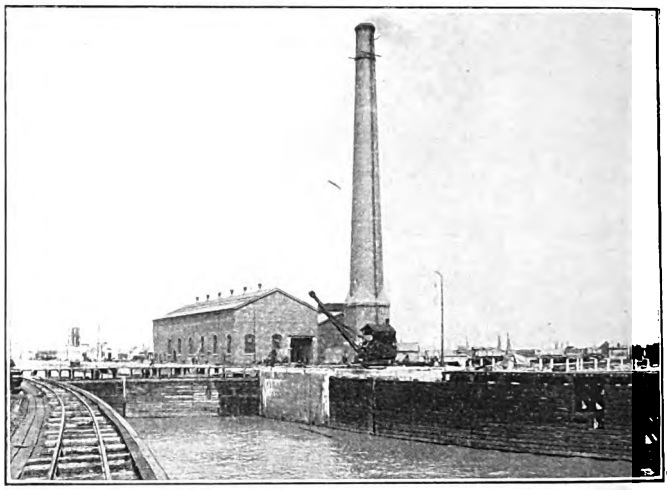
Following an interesting speech by Lord Tredegar, Prince Arthur, in replying to the toast of his health, remarked that it had been a source of the greatest pleasure to him to visit this great port, and that he would go away having learnt something of the industries connected with it. The directors



NEW LOCK ENTRANCE, FROM THE OUTER GATES AND LOOKING TOWARDS THE DOCKS.

Digitized by Google

of the Alexandra Dock Company during the whole course of its history have never been slow in taking advantage in no small degree of the mineral wealth with which the district is so especially favoured by Nature. Its whole story is one of steady progress from the year 1842, when the first dock, now spoken of as the outer basin, was opened; and he offered most hearty congratulations on the spirit of enterprise which has imbued the directors in their desire to keep abreast of the times in the race for commercial supremacy.



NEW LOCK ENTRANCE, FROM WEST PIER.
Showing new pumping and power station from beyond the outer gates.

Viscount Churchill (Chairman of the Great Western), in proposing success to the Alexandra (Newport and South Wales) Docks and Railway, remarked that the prosperity of Newport might be said to have had its genesis in the year 1792, when the first Monmouthshire Canal Act was passed, and that canal company was the forerunner of the Great Western Railway in the western valleys. In those days the population of Newport amounted to only 1,000 souls. Three years ago, at the last census, the population of the town was no less than 84,000. The shipment of coal during the last thirty years had increased by no less than 130 per cent., and to-day he believed it was a fact that there were over forty trains daily with the enormous total of over 20,000 tons brought down for shipment to the Alexandra Docks.

The Mayor of Newport and the Chairman of the Newport Chamber of Commerce also spoke, and Sir Henry Mather Jackson (Chairman of the Alexandra Docks and Railway Company), in a brief reply paid a tribute to the skill of the engineers, the enterprise of the contractors, and the hard work of the men in producing the result they were able to see to-day. Sir Henry added the hope that it was an augury of their success that the first commercial vessel to enter the dock that day, after the Royal opening, was called *The Golden Gate*.

The luncheon, served by Messrs. Lyons, was quite up to the highest standards, and while it was proceeding the Alexandra Docks Male Voice Society and the Society of Newport Gleemen rendered choral selections.

In conclusion, it is necessary to express appreciation of the arrangements made by the Great Western Railway for conveying guests from London. The down special train was made up of nine first-class bogie vehicles and six restaurant cars, breakfast being served during the journey. No. 4040, *Queen Boadicea*, a four-cylinder 4-6-0, worked the train, averaging virtually the mile-a-minute rate as far as Badminton, the 100 miles being covered in 101¾ min. Onwards speed was necessarily lower, but Newport station was passed slowly in 2 hr. 28½ min. At Alexandra Docks Junction the dining cars were detached and the vestibules uncoupled, and an Alexandra Docks engine completed the journey over the dock lines. Returning, with only four restaurant cars, and nine bogies, *Queen Boadicea* completed the journey to Paddington in 2 hr. 28 min. from passing Newport Great Western station, taking virtually the 100 min. for the run from Badminton to Paddington, though the load was even then nearly 400 tons.

Digitized by Google

Pullman Cars on the Caledonian Railway.

IN our last issue brief mention was made of the introduction of Pullman Cars on the Caledonian Railway, and two illustrations were reproduced. Further particulars, for which we are indebted to Mr. T. Powell, Secretary and Manager of the Pullman Car Co., Ltd., are now available. Sixteen of the cars are on six-wheeled bogies, 12 ft. wheelbase, 41 ft. between centres, and the bodies are 57 ft. long, 63 ft. 10 in. including vestibules and platforms, 67 ft. 5¼ in. over buffers, 9 ft. wide in the waist, and 12 ft. 11 in. high from rail level to centre of roof. The exception is the Oban observation car, to which further reference will be made in due course. There are at present three dining cars, "Flora MacDonald," "Fair Maid of Perth" and "Lass o' Gowrie." These replace the dining cars hitherto used on the Glasgow-Aberdeen service. They run on the 7.30 a.m., 10.0 a.m. and 5.0 p.m. from Buchanan Street to Aberdeen, and the 10.5 a.m. (10.35 a.m. from July 1st), 1.10 p.m. (12.50 p.m. from July 1st), and 5.30 trains from Aberdeen. The fourth dining car is not yet in service.

These vehicles are unique in that they serve both first and third-class passengers, and that no supplement is charged. In furnishing there is no difference, but the two saloons into which it is divided accommodate respectively eighteen third-class and twelve first-class passengers, The tables are arranged on either side of a gangway, with seats for four at each on one side and for two on the other. Movable armchairs are provided, upholstered in green morocco. The well-equipped kitchen and pantry are at one end. The kitchen walls are lined with unpainted aluminium, ensuring utmost cleanliness, and the floor is covered with "Decolite" (supplied by Bell's Asbestos Co., Ltd.), a material which is now being extensively used on all the principal railways.

Interior finish is mahogany, veneered and polished, and with inlaid panels. The "Flora MacDonald" is decorated in the Adams style, with white ceilings including carved mouldings and enrichments finished in ivory tone. The "Fair Maid of Perth" is ornamented in the Louis XVI. style, with quartered centre panels including festoons of roses forming ovals. The "Lass o' Gowrie" is decorated in the Pergolesi style, and includes specially selected "curl" mahogany and decorative Pergolesi enrichments.

All the cars are painted standard Pullman colours, dark amber below and cream or ivory tint above. Vestibules, corridors and lavatories are panelled in mahogany. Equipment and staffing of these cars, as also of others to be referred to, is entirely under the direction of the Pullman Car Co., Ltd.

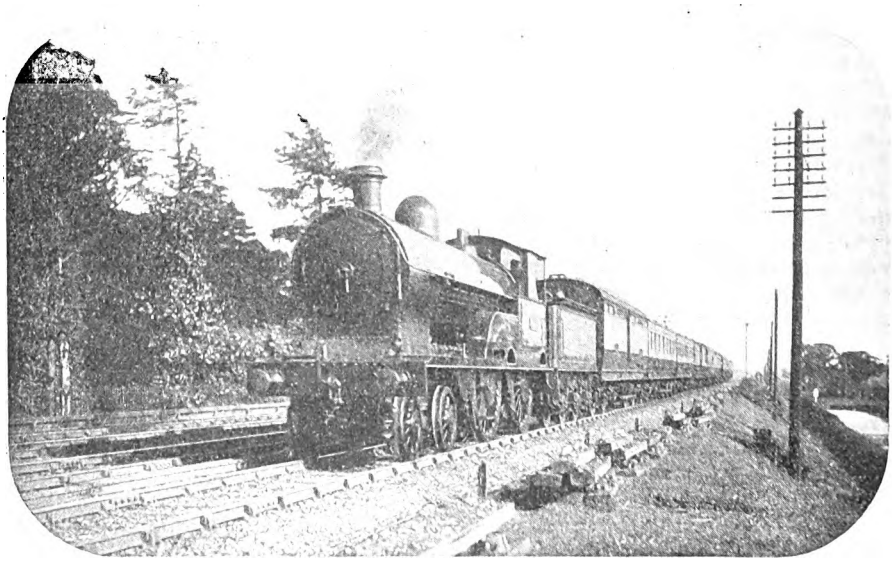
The Buffet cars are now running on the more important express trains between Glasgow and Edinburgh, and other express services, including a buffet car on the "Tinto" residential express between Glasgow (Central) and Moffat, and on the "Strathearn" residential express between Glasgow (Buchanan Street) and Crieff. On these services the cars are reserved for first-class passengers and a supplement of 1s. is charged for each journey. Twenty-one passengers are carried, and the tables are arranged with one armchair at each side of each. In the larger saloon there are three tables on one side and two on the other (owing to the entrance door at that side from the corridor alongside the kitchen). The other saloon has four tables, and in the corner is a private compartment for four passengers, which can be reserved when desired. Decoration and equipment is substantially the same as that already reviewed, yarying in particular vehicles according to the style adopted. Between Edinburgh and Glasgow the "Mary Beaton," "Mary Hamilton," and "Annie Laurie" are now in use and the "Mary Carmichael" and "Mary Seaton" will shortly follow. Other buffet cars will be the "Helen MacGregor," "Duchess of Gordon" and "Baroness Nairne." The full complement is twelve of this type.

For use on the 8.0 a.m. Buchanan Street-Oban service and the return at 4.15 p.m. (5.0 p.m. October-June), the observation car "Maid of Morven" is being provided. This is on four-wheeled bogies, 8 ft. wheelbase, 39 ft. 5 in. between centres, 54 ft. 1⅝ in. long over body, 59 ft. 4¼ in. over vestibule, and 8 ft. 11 in. wide. This car will be run at the end of the train and turned between journeys. At the rear is a large circular-ended compartment, with large observation windows

Digitized by Google

at the sides and end, and has movable arm-chairs, eight at four tables, two on each side and six independent. The other compartment has four tables, three for two passengers each, while the fourth is extensible so that it can be made to serve an additional seat placed against the kitchen wall. The car is completed by the kitchen and lavatories. This car will be subject to a supplementary charge of 2s. 6d., and is being very elaborately equipped by Messrs. Waring and Gillow.

A feature of all these vehicles is the fact that they are electrically lighted on the "Vickers" Single Battery System, which system has been adopted by the Pullman Co. as their standard. Each car is equipped as an independent unit, but in addition to the ordinary hand-operated main switches, magnetic switches are provided with through connections, so that in the event of two or more cars being run together, the lights in the whole of them may be controlled from any individual car. The illumination of the cars has been carried out on a somewhat liberal scale; the buffet cars have each a total of 848 candle power, the dining cars each 832 candle power, and the observation car 816 candle power. In addition to this a special lamp fitting is placed over each of the outside doors to illuminate the steps when passengers are entering or leaving the car. Provision is also made for individual control of the lights, according to passengers' requirements. Variation in the number of lamps burning is, however, compensated for by the special regulator employed, so that the normal voltage of 24 is in no way affected whatever the number of lamps in use. Exhaust ventilating fans, also run on Vickers system, are fitted throughout by means of which the air in the cars is kept perfectly fresh. The special feature of these fans is that they are sunk in the roof and in accordance with the Pullman Company's latest practice are completely concealed by means of ornamental grids, which is a considerable improvement over the arrangement usually adopted, and, moreover, affords a more pleasing finish to the interior of the cars.



Photo] [*H. T. Worlock.*

LONDON AND NORTH WESTERN RAILWAY.

4.45 p.m. down two-hour Birmingham Express, near Kings Langley.
4-4-0 superheater locomotive No. 1799 *Woodcock.*

Digitized by Google

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

SO far as I am aware, the locomotive performance of the North Staffordshire Railway has not been mentioned previously in these columns, and it is, therefore, with exceptional pleasure that I am able to give publicity to two recent runs made behind the fine 4–4-2 superheater express tank engines of Mr. J. H. Adams' design. As will be known to many readers, the North Staffordshire Company is responsible for working a number of trains into and out of Manchester (London Road), and among these is the 12.10 noon express from Manchester to London *viâ* Stoke. This important train always loads heavily, having a portion for Birmingham in addition to the vestibuled restaurant car portion for London. The minimum load from Stockport is usually nine of the latest eight-wheelers, with a twelve-wheeled dining car, weighing empty 313 tons, or with passengers and luggage about 330 tons, but on the first occasion on which I travelled this was increased by two corridor eight-wheelers, and the train thus totalled 359 tons empty (50 axles). A heavy complement of passengers and luggage was carried, so that the complete weight of the train must have reached fully 380 tons. On this trip, as on the second, the engine was No. 55, and the work on both occasions would bear comparison with that of any of the modern British express locomotive types.

On the first run the start from Stockport up the gradually rising grades was very fine with so enormous a load, Cheadle Hulme, 2½ miles, being passed in 4 min. 55 sec. Speed is reduced here for the junction, which hampers the climbing of the subsequent bank, nearly all at 1 in 191-192, to Poynton, but the 3¾ miles from Cheadle Hulme to Poynton were covered in 4 min. 40 sec. On the short level stretch to Adlington we touched all but 50 miles per hour, and on the rising grades beyond, as steep in one place as 1 in 137, and largely at 1 in 154-166, no lower speed than 47·4 miles per hour was registered. Thus we covered the 11¾ miles from Stockport to Macclesfield in 18¼ min.—a more remarkable achievement than would appear on paper owing to the steepness of the rise—against a working time of 18 min. The public time is given as 24 min., but the working departure time from Stockport is 12.25 p.m., and not 12.19 p.m., as shown in the public book. From Macclesfield there is a still steeper climb, the line rising at 1 in 101 from Hibel Road station as far as Macclesfield Moss Box, 2½ miles distant, and up this incline we were banked in rear by a 0-6-0 tank engine, passing the box in the good time of 5 min. 40 sec. from the start. On the falling grades to North Rode viaduct we attained a speed of 62·5 miles per hour, and maintained the mile-a-minute rate for some distance, covering the 5¾ miles from the Moss Box to Congleton in 6 min. 10 sec., and the 3¼ miles thence to Mow Cop in 3 min. 20 sec. Approaching Harecastle, however, while still going excellently, we had the misfortune to be checked badly by signal, and suffered also a further check at Etruria, so that the last 8½ miles from Mow Cop into Stoke took 12 min. 40 sec. The gross time from Macclesfield to Stoke was 27 min. 50 sec. for the 20 miles, but the net time did not exceed 25½ min. at most—a most creditable gain of 1½ min. on schedule time.

The second run was not quite so good, the composition of the train being in this case only normal, or 330 tons in all, although such a load is quite heavy enough to tax a locomotive of this size over so heavy a road. A faster start from Stockport was made,

Digitized by Google

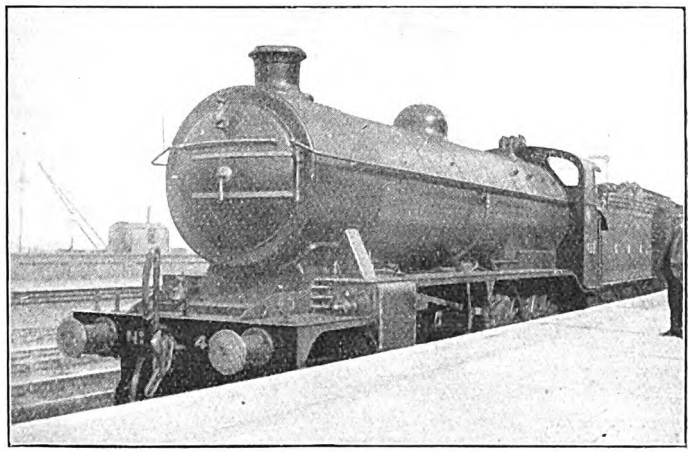
Digitized by Google

form interesting reading, although the load in the latter case—on the 8.30 a.m. *ex*-Manchester—was only 205 tons. From Stockport we passed Cheadle Hulme in 4¾ min., ran from there to Poynton in 4½ min., and from Poynton to Macclesfield in 8 min. 5 sec.—total 17 min. 20 sec. At Macclesfield the bank engine merely gave us a start from Hibel Road to Central, but we passed Macclesfield Moss Box in 5 min. 25 sec., and stopped at Congleton, 8¼ miles, in 12 min. 40 sec. From Congleton we passed Harecastle in 8 min. 5 sec., at 56·3 miles per hour, and reached Stoke, 11¾ miles, in 16¾ min., against 17 min. booked.

On the last-mentioned occasion I continued through to London, and the running was of so exceptionally fast a character that I may as well describe it here. In view of the ease with which we gained on time, I am at a loss to understand why this famous train suffered a still further deceleration in the May time tables. In the days when it was worked daily by the historic 2–4–0 engine *Charles Dickens*, it ran non-stop from Lichfield to London, arriving at 12.20 p.m.; the insertion of the Nuneaton stop, although adding 5 min. to the journey time, introduced some smart bookings as 20 min. for the 19¼ miles from Lichfield to Nuneaton, and 104 min. (working time) for the 97¼ miles from Nuneaton. Now a minute has been added to each of these times, with a minute more at Lichfield, and two minutes more at Nuneaton, making the arrival time 12.30 p.m. It would seem from the times recorded here, however, as though an acceleration of 5 min. were needed rather than a deceleration by that amount.

When we left Stoke our load was a mere featherweight—for the North Western—of five corridor eight-wheelers, or 155 tons with passengers, the engine *Roebuck* working through to London. The first delay was a special stop by signal at Trentham, 2¾ miles from Stoke, to pick up a passenger, this first stage taking 5 min. 40 sec. Starting again, we passed Stoke Junction, 4 miles, in 6 min. 5 sec., at 60 miles per hour, and Colwich (where we were slacked severely by signals), 15½ miles, in 19 min.; the time from Trentham to Lichfield stop, 26¼ miles, was 30 min. 55 sec.—30 min. net. From Stoke our time was 37 min., against a booking of 34 min. for the 29 miles, or 33 min. net. A brilliant little "snippet" run was then made from Lichfield to Nuneaton, the 19¼-mile stretch being covered in 19¾ min., start-to-stop, or 19¼ min. net. Tamworth, 6½ miles, was passed in 7 min. 20 sec.; Atherstone, 14¼ miles, in 14 min. 10 sec.; and mile-post 98¼, 18¼ miles, in 17 min. 50 sec., after which we were checked by signals outside Nuneaton. The top speeds were 68·1 miles per hour at Hademore troughs, 69·2 at Polesworth, and 72·5 after Atherstone, the lowest speed recorded near Atherstone being 64·3 miles per hour.

We left Nuneaton 3 min. late, after attaching the Buxton coach, and increasing the load to 185 tons. Rugby, 14⅜ miles, was passed cautiously in 17 min. 25 sec., and we accelerated to 55·6 miles per hour before entering Kilsby Tunnel, passing Welton, 7⅝ miles, in a further 8¾ min. A long-sustained speed effort was now made. The speed rose to 71·4 miles per hour at Weedon, and fell only to 57·7 at Roade; by Castlethorpe troughs the rate had increased to 73·8, but gradually dropped to 63·8 at Cheddington, and finally to 54·2 at Tring summit; then a final "burst" at 71·4 through King's Langley brought us so well inside schedule time that the conclusion of the run from Watford was of the tamest description. From Welton to Roade the 15½ miles took 14 min.; from Roade to Bletchley, 13⅛ miles, 11 min. 40 sec.; from Bletchley to



Photo] [*R. H. Rose.*

GREAT NORTHERN RAILWAY.
2-8-0 locomotive No. 459.

Digitized by Google

Tring, 15 miles, 14 min. 40 sec.; and from Tring to Watford, 14⅛ miles, 12 min. 55 sec. The last 17½ miles into Euston were run so slowly that they actually consumed 21 min. 5 sec.! Nevertheless, we had run up from Nuneaton in 100½ min., which by smart running from Watford alone might easily have been made "even time" for the 97¼ miles had this been necessary. In any case, 53¼ min. was a smart time for the 57¾ miles from Welton to Watford, as was also the 83 min. 5 sec. from Rugby to Euston, with the very slow finish included.

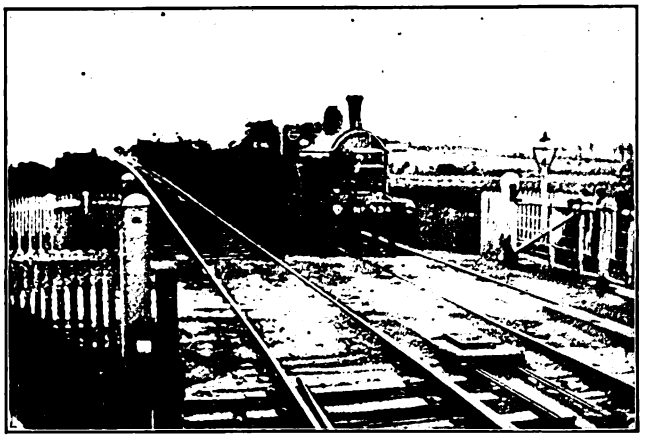
I have to refer to many letters received, but for the present I propose to deal with those which relate to the performances of recent superheater locomotive types, or of existing types that have been superheater-equipped.

One of the latest examples in the latter category is the T 19 class of the Great Eastern Railway, 10 engines of which have just undergone a second process of re-building. Originally these locomotives were of the 2-4-0 type, and 21 of them were rebuilt early in the last decade by Mr. James Holden (to whose designs they were built in the first instance) with the same wheel arrangement, but with larger and higher pitched boilers, their curiously squat appearance earning for them the *soubriquet* of "Humpty Dumpties." Sixty others have since been rebuilt with the large boiler, but also with a bogie instead of the leading radial axle, so that they are now of the 4-4-0 type. Mr. A. J. Hill has recently still further modified 10 of these engines by fitting them with the Schmidt superheater; the original cylinders and motion are retained, an efficient method having been devised for lubricating the slide-valves. I am indebted to the courtesy of a Cambridge correspondent in sending details of two runs with a superheater "T 19" on the Cambridge main line of the Great Eastern Railway, which are the more welcome in that I do not remember having dealt previously in these columns with performance over this stretch of line.

The engine in each case was No. 718, and the train the 5.5 p.m. non-stop express from St. Pancras to Cambridge, which has an easy timing, even allowing for *en route* difficulties, of 74 min. for the 56⅜ miles. On each run the load was light, consisting as it did of 24 axles, or 150 tons, on the first run, and 26 axles, or barely 160 tons, on the second. The first trip had no features of special note, and was, indeed, inclined to be poor in parts. The first 6¾ miles to Tottenham Hale are very difficult, including as they do the slack at Kentish Town, followed by a very steep ascent to Highgate Road, and further bad slacks at South Tottenham and Tottenham North Junction, the latter in particular being very severe. Thus it took 12 min. 7 sec. to pass Tottenham, and the recovery from the last slack was very slow, as the 6¾ miles on to Waltham Cross occupied 9 min. 33 sec. and the 4¼ miles thence to Broxbourne 5 min. 20 sec. The whole of this distance is on almost imperceptibly rising grades. Beyond Roydon a slight permanent way caution was observed, the 7⅜ miles from Broxbourne to Harlow taking 9 min. 32 sec., and the 5⅞ miles thence to Bishop's Stortford, passed at 30 miles per hour, 6 min. 59 sec. This is a slightly steeper stretch, the gradients being largely at from 1 in 320 to 1 in 350. The worst part of the journey is from Stansted up to Elsenham, the grade here steepening to 1 in 107; the 5¼ miles from Bishop's Stortford to Elsenham took 7 min. 56 sec. A fairly fast descent to Cambridge was now made, the 6⅛ miles from Elsenham to Audley End taking 6½ min.; the 4 miles thence to Great Chesterford occupied 4 min. 6 sec.; and the 6¾ miles on to Shelford, 6 min. 24 sec., with a maximum speed of 67 miles per hour near Whittlesford. The final 3¼ miles into Cambridge occupied 4 min. 35 sec., giving a total of 73 min. 2 sec. from London, or 72 min. net.

The second journey was a great improvement on the first, even though time had been more than kept on the first run. Tottenham Hale was passed in 11¾ min., and Waltham Cross in a further 8 min. 33 sec., while the time from Waltham to Broxbourne was 4 min. 40 sec. On the rising grades from Broxbourne to Bishop's Stortford the running was very fine, speed being maintained throughout at an average of 55 miles per hour; the time from Broxbourne to Harlow was 8 min. 2 sec., and from Harlow to Bishop's Stortford 6¾ min. Bishop's Stortford was thus passed in 39¾ min. from St. Pancras, 3¼ min. inside schedule time, and 3 min. 46 sec. below the time of the last run. The climb to Elsenham occupied 7 min. 35 sec., and the descent thence to Audley End 6 min. 20 sec., speed rising to 66 miles per hour. Between the two tunnels beyond Audley End came a slack for relaying, so that the time from Audley End to Great Chesterford was 4 min. 32 sec., but speed was quickly regained,

Digitized by Google



Photo] [*J. B. Minnis.*

GREAT NORTHERN RAILWAY OF IRELAND.
11.15 Londonderry-Belfast train near Knockmore; 4-4-0 locomotive No. 134.

and rose to 68 miles per hour at Whittlesford. Unfortunately the Great Northern 5.0 p.m. express *ex*-King's Cross was running late, with a result that a severe signal check before Shelford was followed by a dead stand for signals just beyond that station for 2 min. 10 sec. Thus the time from Great Chesterford to Shelford was 7 min. 3 sec., and thence to Cambridge stop as much as 10 min. Even then the gross time from London was only 75¼ min.—1¼ min. over schedule—but the net time certainly did not exceed 68 min., representing a very creditable effort on the part of locomotive and driver.

My correspondent has also favoured me with two logs in the return direction on the non-stop 9.38 a.m. express from Cambridge to Liverpool Street, which are worth mentioning in that one was made with a 4-4-0 rebuilt T 19 class engine without superheater, and the other with one of the latest superheater 4-6-0 engines. This is a still more moderately timed train, no less than 78 min. being allowed for the journey of 55⅝ miles, with a load at no time excessive. On the first trip, with the 4-4-0 No. 1030, the train consisted of 2 six-wheelers, 7 eight-wheelers, and one twelve-wheeled restaurant car—40 axles, or 265 tons in all. Shelford, 3¼ miles, was passed in 6 min. and the 6¾ miles thence to Great Chesterford, rising mostly at from 1 in 276 to 1 in 320, were tackled excellently at an average of 48 to 52 miles per hour in 8 min. 16 sec. The steeper grades from Great Chesterford to Audley End, largely at 1 in 135 to 163, were covered in 5 min. 51 sec., this distance being 4 miles, while the last 6⅛ miles up to Elsenham, including 3¼ at 1 in 176 to 254, took 8 min. 8 sec. A service slack at Stansted to 40 miles per hour spoils the descent to Bishop's Stortford, and this 5¼ miles occupied 6 min. 17 sec., the usual 30 miles per hour slack being observed at the latter point. The total time from Cambridge was thus 35 min. 32 sec. or 1½ min. less than schedule. Very easy running now ensued on the gradually falling grades to Tottenham; the 5⅞ miles from Bishop's Stortford to Harlow took 7 min. 2 sec.; the 7⅜ miles from Harlow to Broxbourne 8 min. 13 sec.; and the 11 miles thence to Tottenham 12 min. 12 sec. The last 6 tortuous miles into Liverpool Street consumed 12 min. 10 sec., giving an aggregate time from Cambridge of 74 min. 9 sec.; a late start of 1¾ min. had thus been converted to an arrival over 2 min. early, the principal credit of this gain of nearly 4 min. on schedule time being due

Photo] [*J. B. Minnis.*

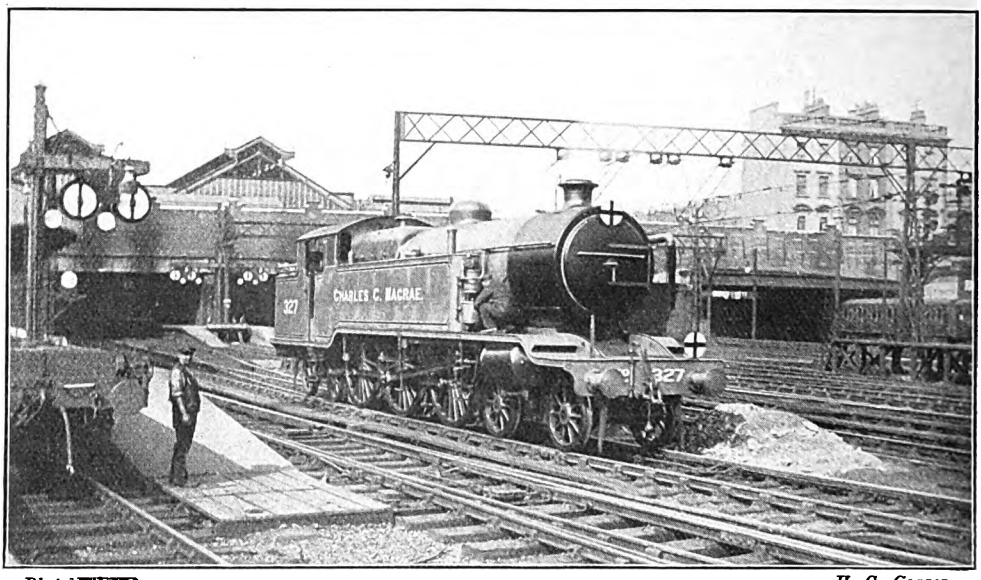
GREAT NORTHERN RAILWAY OF IRELAND.

6.50 a.m. Dublin-Belfast train near Knockmore; 4-4-0 locomotive No. 82.

Digitized by Google

to the good work from Cambridge to Elsenham.

This run, however, is quite overshadowed by one which my friend secured on the same train with the 4-6-0 Schmidt superheater engine No. 1512, hauling a fractionally lighter load of 37 axles, or 250 tons. The start, which in this case was 3 min. late, was brilliant, Shelford being passed in 5 min. 37 sec., and Great Chesterford, 10 miles, in 13 min. 14 sec., despite the rising gradient. A bad permanent way check between the Audley End tunnels spoilt the running from Great Chesterford to Audley End, which consumed 6 min. to Waltham Cross, 4¼ miles, in 4 min. 7 sec. and from Waltham Cross to Ponder's End, 3 miles, in 2 min. 55 sec.—total, 14⅝ miles in 14 min. 4 sec. Angel Road, 48 miles from Cambridge, was passed in 56 min. 16 sec., or 54¾ min. net, but the train was now getting so well before time, having gained fully 6 min. on schedule, that adverse signals were to be expected. These were experienced between Angel Road and Park, and were followed by a dead stand in Park station for 38 sec.; after this there were frequent checks all the way up to Liverpool Street, which was reached, however, ¾ min. early, in 74 min. 17 sec. from Cambridge.



Photo] *H. G. Cogger.*

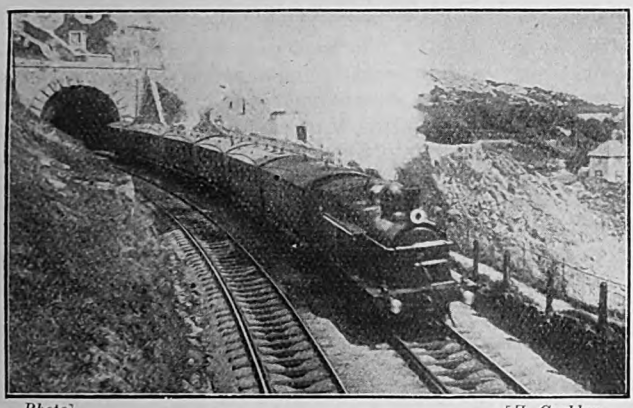
LONDON BRIGHTON AND SOUTH COAST RAILWAY.

New 4-6-4 express tank engine, No. 327, *Charles C. Macrae*, backing on to 3.53 p.m. Victoria-Portsmouth train.

6 sec., but the recovery on the rise to Elsenham was noteworthy, the time from Audley End to Elsenham being 7¼ min., and from Elsenham to Bishop's Stortford 5 min. 55 sec. From Cambridge to Bishop's Stortford, therefore, No. 1512 had only used 32½ out of the schedule time of 36 min., or 31 min. net—no mean achievement in view of the almost continuously adverse gradient. The slack at Bishop's Stortford was more pronounced than on the previous run, so that 7 min. 13 sec. were consumed between that point and Harlow, but then No. 1512 showed off her speed capabilities to some effect, running from Harlow to Broxbourne, 7⅜ miles, in 7 min. 2 sec., from Broxbourne, Even the gross time thus showed a gain of 3¾ min. on schedule, but the net time, allowing for the usual service slacks, and the customary "crawl" from Tottenham, was not more than 68 min. for the 55½ miles—a modest 10 min. gain on booked time.

Curiously enough, I have at the same time received from another friend details of a recent run from Ipswich to London with an engine of the T 19 class rebuilt among the first batch without a leading bogie. The timing of the train in question—the 4.20 p.m. from Ipswich to Liverpool Street—offers even less an incentive to locomotive achievements than the

Digitized by Google



Photo] [*H. Coghlan.*

DUBLIN AND SOUTH EASTERN RAILWAY.

Down train at Bray; 2-4-2 tank engine No. 27, *St. Aidan.*

Cambridge line bookings already described, no less than 98 min. being allowed for the 68¾ miles from Ipswich. For a good part of the distance, however, the work was quite on a level with the best summer bookings, even with so comparatively small an engine as this. The load was one of 7 eight-wheelers, and 4 six-wheelers, totalling 40 axles or 250 tons behind the tender, and the engine No. 702. Despite the stiff initial rise to Belstead box, Manningtree, 9¼ miles, was passed in 14½ min., and Colchester, after the climb from Manningtree to Ardleigh, 17 miles, in 25 min. The 5 uphill miles from Colchester to Mark's Tey took 6½ min.; the 8 undulating miles thence to Witham 8¾ min.; and the similar stretch of 9 miles from Witham to Chelmsford, where the usual slack was made, 10 min. 25 sec. The time of 50 min. 40 sec. from Ipswich to Chelmsford was thus but little above the summer service schedule of 49 or 50 min. by expresses calling at Ipswich, but as the train was now 3¼ min. before time, much easier running followed. From Chelmsford up to Shenfield the 9½ miles occupied 12 min. 50 sec., and from Shenfield to Chadwell Heath, 10¼ miles, 11 min. 10 sec. were taken; thenceforward, however, many signal delays were experienced, causing the last 10 miles into the terminus to take 19 min. 50 sec. Even then, however, 3½ min. had been gained; the net time was not more than 90 min., while with smarter running from Chelmsford this might easily have been 88 min. or 10 min. below that booked.

A famous class of locomotives to which superheaters are now being fitted by degrees is the "Dunalastair II" class of the Caledonian Railway, together with certain of the enlarged "Dunalastairs" of the third batch. I had an interesting experience with No. 901 of the latter type recently, which is worthy of description, on the 4.30 p.m. Liverpool and Manchester Express *ex*-Glasgow. My only regret was my inability to travel on the previous day—a Monday—when the load from Glasgow was one of 48 axles, and from Symington of 54 axles, behind the same engine; on the day on which I travelled the initial load was only 32 axles, or 225 tons with passengers, but we were hampered by a gale of wind from the north-east. We started well, passing Rutherglen, 3⅛ miles, in 6 min. 10 sec., Uddingston, 8½ miles, in 12 min. 25 sec., and Motherwell, 12⅞ miles, in 18 min.—smarter running than might appear at first sight, in that an almost unbroken stretch of grades adverse to the engine commences at Rutherglen. As we were now comfortably inside schedule time, the work began to fall off somewhat, the 5⅜ miles from Motherwell to Law Junction, where the grade steepens to 1 in 99, taking 9¼ min., speed at this point having dropped to 31 miles per hour.

Photo] [*L. H. Bailey.*

CALEDONIAN RAILWAY.

10.10 a.m. Glasgow-Liverpool Express starting from Beattock; 4-4-0 locomotive No. 143.

Digitized by Google

After slipping the Lanark coach at Carluke, the load being thus reduced to 185 tons, the rate increased to 34·6 miles per hour, but, as we caught the wind again severely, it dropped to exactly 30 at Craigenhill—the summit of the long rise from Rutherglen. The 10½ miles from Law Junction to Carstairs took 16 min. 55 sec., the total time for the 28¾ miles from Glasgow being 44 min. 10 sec. —1 min. 50 sec. under schedule. From Carstairs to Symington, largely uphill at a 1 in 150 inclination, the 6⅝ miles were covered smartly, with unchanged load, in exactly the allotted 10 min.

At Symington we added three coaches from Edinburgh, bringing the load up to 38 axles, or 270 tons. Again we started well, passing Lamington, 3⅝ miles in 6 min. 10 sec. at sixty miles per hour, aided by the 3-mile descent to the Clyde, while speed was maintained well up the rising grades beyond. At Abington the rate had only fallen to 54·2 miles per hour, and at Crawford to 52·5 (after 8 miles up at from 1 in 240 to 330) the 11⅝ miles from Symington to this point having taken 14 min. 55 sec., but once again there was a very perceptible falling off, speed falling to 40·9 miles per hour on the 1 in 150 approaching Elvanfoot. Finally with a brief acceleration on the level mile to all but 50 at the Clyde bridge, the speed fell to 30·6 miles per hour on the 2¼ miles at 1 in 100 to Beattock Summit. The grades were not sufficiently steep, of course, to cause so great a reduction in speed; the "easing" of the engine in each instance was quite marked. Still, we had covered the 17⅛ miles from Symington to Beattock Summit in 23 min. 5 sec., or a minute under schedule time. A permanent way check was experienced on the descent to Beattock station, making our total time for the 27⅛ miles 34 min. 40 sec., or 33 min. net, against a booking of 34 min. It will be seen that this train is sharply booked south of Carstairs, considering the grades, and the tightness of the timing is still further evident beyond Beattock, in that the 14 miles to Lockerbie, start-to-stop, must be covered in 15 min., and the 25¾ miles thence to Carlisle in 29 min.

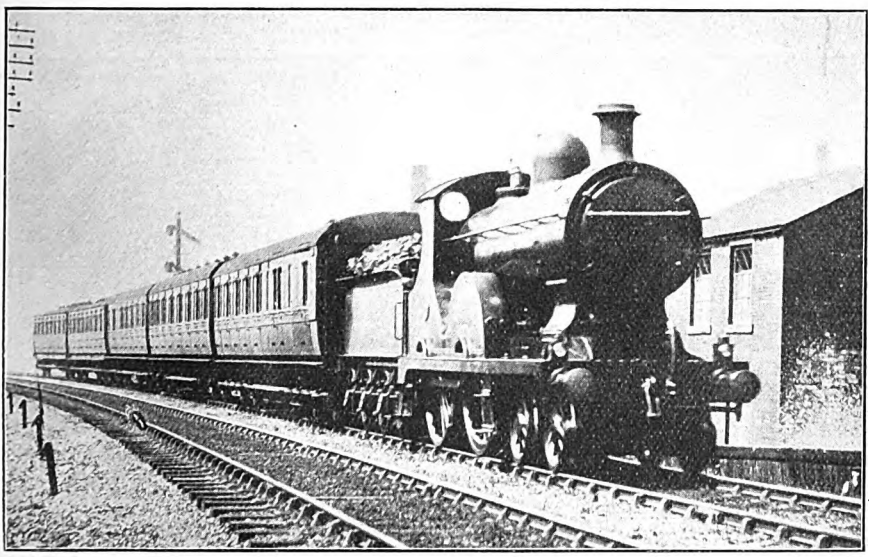
On the first "snippet," having shed a further coach for Moffat, and reduced the load to 235 tons, we attained a speed of 68·1 miles per hour at the foot of Beattock Bank, passing Wamphray, 5¼ miles in 6 min. 50 sec. After a brief fall to 66·2 the speed then rose to a sustained 72·5 miles per hour on the undulating stretch to Dinwoodie, this 5⅞ miles occupying 5 min. exactly. So we reached Lockerbie comfortably in exactly the allotted 15 min. Starting again, a speed of 44·5 miles per hour was attained on the adverse 1 in 528, and maintained on the 2 miles at 1 in 200 to Brackenhill Summit; the short drop past Ecclefechan raised the rate to 69·2, the ensuing rise past Kirtlebridge bringing it down again to 64·3; and then, after a rapid acceleration to 70·3, steam was shut off, and we "coasted" down to Gretna. It was remarkable to notice how the momentum of a train is maintained even on so flat a grade as 1 in 200, as our speed after fully 4 miles of coasting had not dropped below 58 miles per hour. Our time from Lockerbie to Kirtlebridge, 9 miles, was 12 min. 5 sec.; from Kirtlebridge to Gretna, 8⅛ miles, 7½ min.; and from Gretna into Carlisle, 8⅝ miles, 8 min. 50 sec., this total time of 28 min. 25 sec. being obviously capable of reduction to at least 27 min. by means of a normally fast run down Kirkpatrick bank. These engines thus appear to be doing exceedingly well, but I should be interested to test their capabilities with a heavier load. On the evening prior to writing No. 901 left Carlisle on the 8.13 p.m. express with 360 tons behind the tender, and the famous No. 766 —also now a superheater—on the 8.48 p.m. express with 345 tons; the run on either train would have been well worth timing, had opportunity offered.

In the April issue I gave details of a trip with one of Mr. J. G. Robinson's large new 4-4-0 superheater engines on the Great Central Railway, on which run the hill-climbing work was of quite an exceptional character, while the downhill running was not worthy of special note, time being well in hand on all the down grades. Any doubt as to the speed capabilities of these remarkable engines is, however, set at rest by the details of a run forwarded to me by a Leicester correspondent, which recalls the "palmiest" days of Great Central speed. Curiously enough, it was not made on a "crack" express, but on a special excursion train from Nottingham to London, calling at Leicester, Lutterworth and Rugby. From the last-mentioned point 105 min. were allowed for the non-stop run to London *viâ* Wycombe, a distance of 87¾ miles. The load was one of seven non-corridor eight-wheelers, or 185 tons, and the engine No. 430, *Purdon Viccars*, ably handled by driver Williamson. The start was inauspicious, the excursion being shunted at

Digitized by Google

Leicester for the Newcastle-Barry express, and checked by the latter all the way to Lutterworth; from there to Rugby the 6¾ miles were covered very smartly in 8 min. 44 sec., start-to-stop, a maximum of 82 miles per hour being reached on the 1 in 176 grade.

It was at Rugby that the interest of the run began. Shortly after starting a permanent way slack was encountered, but the engine recovered smartly, passing Braunston, 4¾ miles, in 6 min. 10 sec. at 70 miles per hour, the grades for this distance being but little easier than level. The 7-miles' ascent at 1 in 176 to Charwelton was



Photo] [*A. Conville.*

LANCASHIRE AND YORKSHIRE RAILWAY.

Manchester-Colne Express; 4-4-0 (Schmidt superheater) locomotive No. 1112.

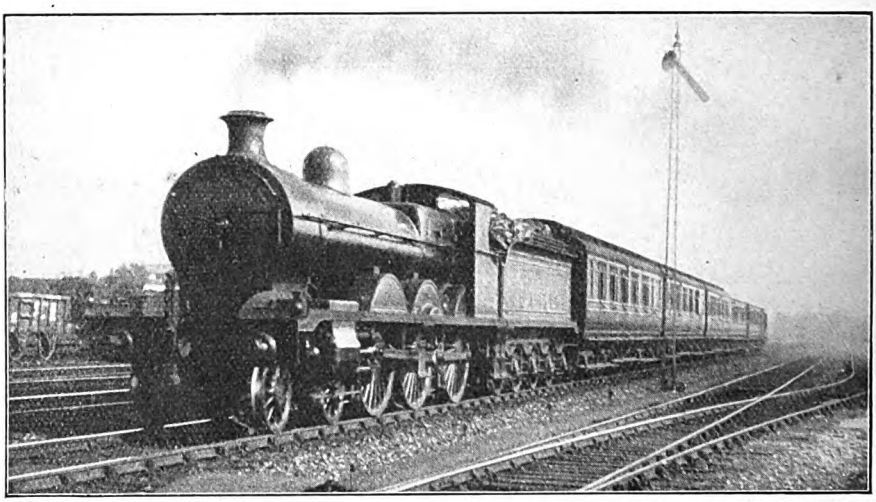
now ascended in fine style, the time occupied being only 7 min. 50 sec.; Catesby tunnel was threaded in 2 min. 6 sec., which gives a minimum speed of 48·7 miles per hour. The mile-a-minute rate had just been attained again when Woodford was passed, in 16 min. 41 sec. from Rugby start, the distance being 14⅛ miles. A high speed was maintained over the 9⅞ miles of 1 in 176 undulation from Woodford to Brackley, which occupied 8 min. 34 sec., and a tremendous spurt was then made on the long descent to Grendon Underwood. Successive miles from Brackley were covered in 45, 44, 47, 50, 92 (two miles), 44, 44, 44 and 46 sec., giving a total time for 10 miles of 7 min. 36 sec., which represents an average speed of 78·9 miles per hour. My correspondent recorded a time of 10 sec. for two different ¼-miles—one 1½ miles south of Brackley, and another just beyond Finmere—but as an ordinary watch was used it is not safe to say that a speed of 90 miles per hour was actually touched in either instance, although it is quite evident that, with three successive miles covered at an average speed of 81·8 miles per hour, the maximum might be well above the figure. On the short intermediate rise of 1½ miles at 1 in 176 to Finmere the speed did not fall below 69·2 miles per hour. So the 12⅜ miles from Brackley to Grendon Junction, where speed was reduced to 57 miles per hour, were covered in the unusual time of 9 min. 40 sec., the total time from Rugby, 36⅜ miles, being now 34 min. 55 sec. Schedule time, which to this point was 40 min., was now being rapidly left behind.

Still the driver's efforts were not relaxed, owing to the lateness of the start, the 4½ miles from Grendon to Wotton being covered in 4 min. 25 sec., and the 5⅜ miles thence to Haddenham in 4¾ miles, while the 5½ uphill miles from Haddenham up to Princes Risborough were tackled in great

Digitized by Google

style in exactly 5 min. The "score" was now 51¾ miles from the start in 49 min. 5 sec. The sharp rise of 3⅛ miles from Risborough to Saunderton occupied 3 min. 29 sec. and the descent thence to Wycombe, with the usual severe slacks at West Wycombe and High Wycombe, 5 min. 16 sec., the latter distance being 5 miles. Speed was again picked up with remarkable smartness, the climb of 4⅞ miles from Wycombe to Beaconsfield being negotiated in 5½ min., but the descent of Gerrard's Cross Bank was spoiled by a severe permanent way check at Denham, after a maximum of 75 miles per hour had been touched. So the 6⅞ miles from Beaconsfield to Denham took 6 min. 40 sec., and the 4½ miles thence to Northolt Junction 6 min. 10 sec. The Denham slack must have cost at least 3 min. Fast running is not possible beyond Northolt, owing to the slack for the junction and that at Neasden, in addition to the permanent cautions in force at various points, so the last 11⅝ miles into Marylebone consumed 15 min. 40 sec. But even then the total time for the 87¾ miles from Rugby to London was only 91 min. 40 sec.; allowing for the two relaying slacks the net time could not have exceeded 88 min., this representing "even" time over a heavily graded road with slacks at Grendon Junction, West Wycombe, High Wycombe, Northolt Junction, and cautious running from that point into the terminus. From such a run as this it would seem that Mr. Robinson's latest type is likely to prove his *chef d'œuvre*. It only remains to add that the gross time on this trip showed a curtailment of booked time by 13 min. 20 sec., and the net time a modest gain of 17 min., in order that its phenomenal character may be emphasized.

I also had a very fair run with No. 432, *Sir Edward Fraser* of the same type, on the 3.15 p.m. "Sheffield Special" *ex*-Marylebone, although it was evident throughout the journey that the engine was working very well within its powers. The load consisted of the usual four large eight-wheelers for Manchester, the Leicester slip coach and the directors' saloon, which also was bound for the latter destination. On starting, therefore, we had 210 tons behind the tender. Harrow, 9¼ miles, was passed in 14 min. and Rickmansworth (at reduced speed), 17¼ miles, in 22 min. 5 sec.; the Chorley Wood bank was ascended at a speed of from 36 to 37·2 miles per hour, and Amersham, 23⅝ miles, was passed in 32 min. 20 sec. Down to Aylesbury the speed was most moderate, the 14⅜ miles from Amersham taking 13 min. 40 sec., and the driver's caution at junction points was almost painfully exemplary, speed being reduced to 50 miles per hour at Aylesbury, 45 at Quainton Road Junction, and actually



Photo] [*R. J. Purves.*

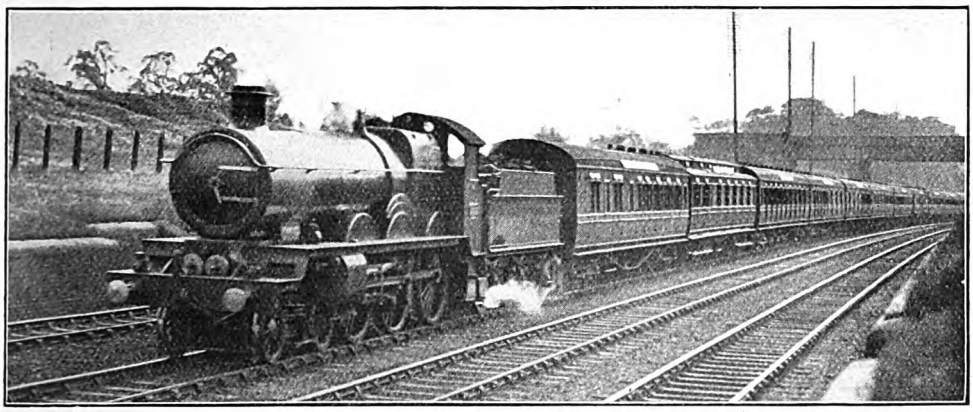
GLASGOW AND SOUTH WESTERN RAILWAY.

9.30 a.m. St. Pancras-Glasgow Express at Kingmoor; 4-6-0 locomotive No. 383.

Digitized by Google

to 50 at Grendon Underwood, where the line is practically straight, and the points are trailing. So the $8\frac{7}{8}$ miles from Aylesbury to Grendon took $9\frac{1}{2}$ min., and the $12\frac{3}{8}$ miles thence to Brackley $13\frac{1}{2}$ min., although these comparatively smart times speak well for the accelerative powers of the engine up the 1 in 176 grade from Grendon. The $9\frac{3}{8}$ miles from Brackley to Woodford took us 9 min. 40 sec., and now, with 78 min. 40 sec. already credited to the 69 miles from London, the pace necessarily began to improve. Down the 1 in 176 to Braunston we maintained a speed of 81·8 miles per hour for some distance, covering the $14\frac{1}{4}$ miles from Woodford to Rugby in 12 min. 5 sec.; from Rugby to Leicester we took 17 min. 35 sec. for the $19\frac{3}{4}$ miles, slipping our two coaches at reduced speed in 108 min. 20 sec. about $173\frac{1}{2}$ min., but obviously even this $3\frac{1}{2}$ min. gain by no means expressed the full measure of the locomotive's tractive powers.

Apropos of the achievements of the Great Central 4-6-0 engine No. 196 on the Great Northern main line, to which reference was made in the April number of the RAILWAY MAGAZINE, two friends have kindly supplied me with details of a number of runs with this engine, and also behind the three-cylinder "Atlantic" No. 1090, and the smaller 4-4-0 engines. These runs all relate to the up train, and not only put my own runs in the shade, but also everything that I have seen recorded behind Great Northern types over this particular stretch. The number of these runs is such, however, that I must defer all reference to them until a suitable opportunity presents itself. Meanwhile, as in the article just referred to I mentioned the good work that I have always recorded in the up direction behind the Great Northern superheater "Atlantic" No. 1456, I wish to draw attention to a still finer run behind the same engine that I was fortunate enough to secure only a few days after writing the passage in question.



Photo] [*F. E. Mackay.*

GREAT WESTERN RAILWAY: UP CORNISH EXPRESS.

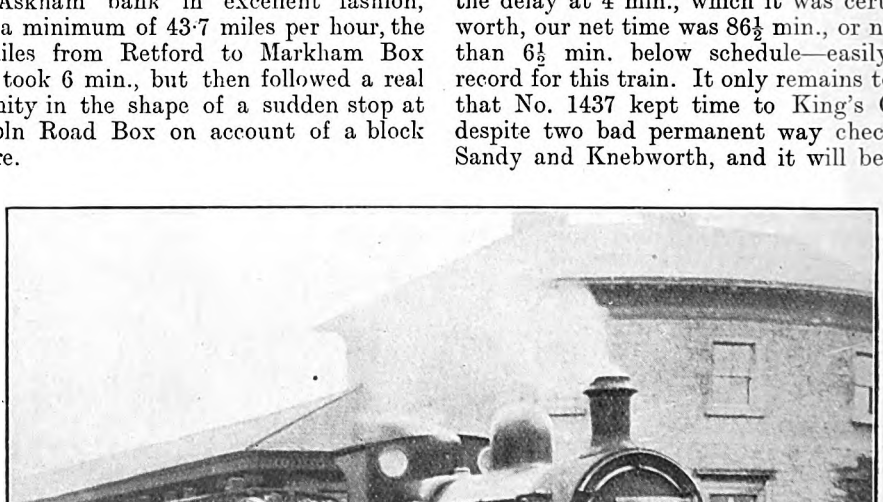
Four cylinder 4-6-0 locomotive No. 4026, *King Richard.*

from Marylebone—practically as booked. From Leicester to Nottingham with the load now 145 tons, speed was again moderate, the $9\frac{7}{8}$ miles to Loughborough taking 9 min. 50 sec., and the $13\frac{5}{8}$ miles thence to Nottingham $13\frac{1}{4}$ min. Onward from Victoria station, which we passed at the usual "crawl," the work was as good as on any part of the journey; the $20\frac{1}{4}$ miles to Heath were climbed in 23 min. 20 sec., after which we ran the 13 miles down to Woodhouse cautiously in 13 min. 10 sec. At the conclusion of the run, after slacking for Woodhouse Junction, we had the usual severe slack past Darnall cutting, followed by what was nearly a dead stand outside Sheffield; thus the last five miles took $7\frac{3}{4}$ min. The gross time was 175 min. 40 sec. for the $164\frac{3}{4}$ miles, and the net time

The train was the familiar 12.15 noon express from York to London, and as, on arrival at Doncaster, where I intended to join the train, I found it signalled "York 3 late, Selby 13 late," I was not anticipating the happiest of experiences. However, my spirits rose when No. 1456 hove in sight, more especially as one minute of the arrears had already been made up on the tight 23-minute allowance from Selby. Leaving

Digitized by Google

Doncaster, now only 9 min. late, we had 7 eight-wheelers and 3 twelve-wheelers, or 330 tons, behind the tender, and 1456 started well by getting up a speed of 54·2 miles per hour before Rossington, and only falling to 47·4 at Piper's Wood. So Bawtry, 8¼ miles, was passed in 11 min. 50 sec., and Retford, 17½ miles, in 21 min., the top speed at Scrooby being 65 miles per hour. Breasting Askham bank in excellent fashion, with a minimum of 43·7 miles per hour, the 4¾ miles from Retford to Markham Box only took 6 min., but then followed a real calamity in the shape of a sudden stop at Lincoln Road Box on account of a block failure.



Photo] [*J. Macartney Robbins.*

MIDLAND GREAT WESTERN RAILWAY.

Galway-Dublin train at Mullingar; 4-4-0 locomotive No. 5 *Croagh Patrick.*

This stop lasted 25 sec., and spoiled our descent to Carlton, on which the highest speed attained was only 70·3 miles per hour; the time from Retford to Tuxford, 6¼ miles, was 11 min. 20 sec., and from Tuxford to Carlton, 5¾ miles, 5¾ min. From Carlton to Newark speed was well maintained, this 6½ miles taking only 5 min. 50 sec., and the running thence to Grantham was exceptional, the speed at Claypole being 56·3, at Hougham 54·2, and at Peascliffe Tunnel as high as 45·5 miles per hour. Thus the 14¾ miles from Newark to Grantham were covered in 16 min. 25 sec., and the 5¼ miles thence up to Stoke only took 7 min. 40 sec., although the speed fell to 38·5 miles per hour at the summit. Descending to Peterborough the speed, though high, was not excessive, as a maximum of 77.5 miles per hour was not exceeded; the 11½ miles from Stoke to Essendine took 10 min. 25 sec., and the 12¼ miles thence into Peterborough 12 min. 10 sec., making a total time of 90 min. 35 sec. for the 79¾ miles from Doncaster. Estimating the delay at 4 min., which it was certainly worth, our net time was 86½ min., or no less than 6½ min. below schedule—easily my record for this train. It only remains to add that No. 1437 kept time to King's Cross, despite two bad permanent way checks at Sandy and Knebworth, and it will be seen that this was, throughout, an unusually successful journey.

I have always entertained the greatest admiration for the work of the superheater 4-4-0 engines of Mr. Ivatt's design on the Great Northern Railway—the developments of class W, numbered from 51 to 65—but a run for details which I am indebted to a friend at Scarborough even exceeds my estimate of their ability. This was, apparently, a trial run of No. 51, the pioneer of the class, and was made on as important a train as the 1.30 p.m. *ex*-King's Cross, from Peterborough to Doncaster. The load was rather heavier than usual, con-

Digitized by Google

sisting of 7 eight-wheelers and 2 twelve-wheelers—40 axles—or 300 tons in all with passengers and luggage. No sooner had the train started than it was pulled up by signal at Crescent Junction, and the times were taken from there. Essendine, 12 miles, was passed in 16½ min., from the fresh start, but my friend unfortunately omitted to record the passing time at Stoke summit. The speed approaching Grantham rose to 69·2 miles per hour, this point, 28¾ miles from Crescent Junction, being passed in 36¾ min., and a remarkable speed exhibition was then given. Between Grantham and Newark the rate rose to 75 miles per hour, this 14¾ miles taking only 12¼ min.; the 18½ miles from Newark to Retford took 19 min. 35 sec., with a minimum of 52 miles per hour at Markham; while the last 17½ miles from Retford to Doncaster were covered in 16 min. 55 sec. Thus the Peterborough to Doncaster time was 87 min. 35 sec. for the 79¾ miles, even including the Crescent Junction stop, but the time for the 79½ miles from Crescent Junction to Doncaster was only 85½ min. A time of 48¾ min. for the 50¾ miles from Grantham to Doncaster is almost in the nature of a record, and does so moderately powered an engine and its driver the greatest credit. It is worthy of note that nearly all the runs described in this issue—in a number of instances on expresses of first-class importance—were made with 4-4-0 engines, as illustrating the consistent reliability of engines of this typically British wheel arrangement.

The Midland runs given in the March issue of the RAILWAY MAGAZINE, have brought me an interesting letter from a London correspondent, who remarks:—"Most of the runs recently recorded of the Midland had seemed to me below the best standard of that line in regard to load haulage, and it was therefore gratifying to find some showing good loads, as these heavy trains are not so uncommon as readers might be led to infer from the frequent accounts of runs with very light loads." Nevertheless it must not be forgotten that unpiloted loads on the Midland Railway are strictly limited according to the working time-tables, the maximum load, for example, on the 105-min. Leicester expresses being shown as 240 tons for the compound and large 4-4-0 simple locomotives, 200 tons for re-built 4-4-0 engines, and 180 tons for single-wheelers. Needless to say, occasions of excessive load arise at times when a pilot is not available, and the best must then be made of the difficulty; but judging by the nature of this "best," it might be wished that these occasions arose more frequently. Strangely enough, I recently calculated—for another purpose—an average load for all the unpiloted runs that I have had on "crack" Midland trains, both North and South of Leeds, and found that in each case, it worked out at almost exactly 210 tons, equivalent to a load of about 28 to 30 axles. My correspondent forwards me, however, logs of two runs on the Midland—one piloted and the other unpiloted—on which the loads were really exceptional for that line: they would be exceptional, indeed, on any line for correspondingly rapid schedules over such formidable gradients.

In the first instance the train concerned was the 10.10 a.m. from Manchester to London, due into St. Pancras at 1.57 p.m. The recent history of this express has been divided into three periods—first, as non-stop from Chinley to London, 170¼ miles, during which period the starting time from Manchester was 10.15 a.m.; second, the putting forward of the Manchester start to 10.10 a.m., and the insertion of a stop at Trent Junction to attach the through Nottingham-Deal coach; and third, the substitution of a stop at Derby for that at Trent, the South Eastern and Chatham coach being transferred to the 10.15 a.m. from Leeds to London. It was during the second of these periods that my friend made his run, the load on leaving Trent amounting to no less than 60 axles—12 eight-wheelers, and 2 twelve-wheelers, well-filled, totalling in weight at least 410 tons. No pilot being available at Trent, the compound 4-4-0 No. 1021 worked this tremendous train unassisted to Leicester, covering the 19¾ miles—mainly level, but slightly adverse beyond Loughborough—in 26¼ min. At Leicester the 7 ft. 4 in. 4-2-2 No. 628 was attached, and the work of these two engines—the two types make a remarkable speed combination, as I have proved previously—thence to London was exceedingly fine. Wigston, 3¾ miles, was passed in 6¼ min.; Kibworth, 10¼ miles, in 14 min.; Market Harborough, 16 miles, in 19¼ min.; and Desborough, 21 miles, in 25¼ min. Speed now ruled high, the 6 miles to Kettering taking 5¼ min.; the 7 miles thence to Wellingborough 6 min.; and the 15¼ miles over Sharnbrook Summit to Bedford 14½ min. Unfortunately the

Digitized by Google

summit time, and the various maxima and minima, are not given in the log. The time for the 8 miles from Bedford up to Ampthill was one of the quickest I have seen recorded, only 7¾ min. being taken for the 8 miles, and the 11½ miles on to Luton only occupied 12¾ min. From Luton to St. Albans, 10¼ miles, 9½ min. were taken; from St. Albans to Hendon, 13 miles, 10¾ min. and from Hendon to a dead stand for signals at the ¼ mile-post outside St. Pancras, 6¾ miles, 7½ min. Thus the distance of 98¾ miles had been covered in 99 min., start-to-stop, the passing time to Finchley Road, 95½ miles, being 95 min.; this meant a net time to St. Pancras of about 100 min., although the actual time was one of 102½ min.

On the second run, which was made on the 6.30 p.m. Scotch express from Leicester to London, the load was almost identical with that of my own run on the same train, given in the March issue, but the train in this case was not piloted, so that the compound 4-4-0 No. 1041 had a tough proposition involved in keeping the 105 min. schedule to St. Pancras. The train was made up of 9 eight-wheeled coaches and 2 twelve-wheeled restaurant cars, totalling 48 axles, or 325 tons in all. Being well on time, the driver made no special effort to achieve lightning downhill times, but the hill climbing was of a really superlative order. Wigston, 3¾ miles, was passed in 6 min. 10 sec., and Kibworth, 10¼ miles, in 13¼ min., the grades on this initial stretch being entirely against the engine. Market Harborough, 16 miles, was reached in 18 min. 35 sec., and the 5 miles of stiff ascent thence to Desborough were tackled in 6 min. Thus Kettering, 27 miles, was passed in 30 min. 10 sec.—a time superior to many that I have recorded with substantially inferior loads. The time of 20 min. 5 sec. for the 22¼ miles from Kettering to Bedford was really extraordinary, and I should again have been most interested to know the summit time at Sharnbrook and the minimum and maximum speeds before and beyond that point. From Bedford—passed in 50¼ min. from Leicester— 8 min. 20 sec. were taken to pass Ampthill, and 22 min. 57 sec. to Luton, the grades on the 19½ miles' ascent beginning to tell against the engine with so heavy a load. But the run finished with a splendid "spurt" into the terminus, the 10¼ miles from Luton to St. Albans taking 10 min. 13 sec.; the 13 miles thence to Hendon exactly 11 min., with a maximum of just 80 miles per hour near Radlett; and the final 7 miles from Hendon to St. Pancras 8¼ min. The total time of 102 min. 40 sec. from Leicester to London with a load of 320 tons—80 tons in excess of the maximum specified for this type of engine—represented a feat of which the driver might justly be proud.

In conclusion I have to mention a communication received from a Birmingham reader, who has noticed a discrepancy between the figures given in the recent superheater locomotive tables in these columns—in regard to the boiler dimensions of certain modern Great Western locomotive types—and a table of boiler dimensions that appeared in the *Great Western Railway Magazine* for March of last year. My figures, I may say, were taken from the special Great Western Railway supplement to the *Engineer*, December 16th, 1910, the information in connection with which was, I presume, supplied by the Great Western Company. In all probability, however, the later figures may be taken as accurate, so I give them herewith:—

Wheel Arrangement.	Diameter of Coupled Wheels.	Boiler.	Total Heating * Surface.	Working Pressure.
	ft. in.	No.	sq. ft.	lb. per sq. in.
4-6-2	6 8½	6	3,400	225
4-6-0	6 8½	1	2,128	225
2-8-0	4 7½			
4-4-0†	6 8½			
2-6-0	5 8	4	1,694	200
2-6-2T	5 8			
2-8-0T	4 7½			
4-4-2T	6 8½	2	1,316	195

* Including Superheater. † "County" Class. T Tank Engine.

Digitized by Google

The Railways of "Little England Beyond Wales."—[No. II.]

By G. W. J. POTTER.

PEMBROKE station is situated at the extreme east of the town, and recently a halt has been opened at Golden Hill, by which means the Castle, church, etc., are rendered more easy of access. As the train crosses the Pembroke river a splendid and comprehensive view is obtained of the stately ruins of the Castle and the quaint old town encircling it on one side and the river on the other.

Thence onward tothe station at Pembroke Dock is just over a mile, a short tunnel being passed through on the way. The station is a modern erection of neat design and is equipped with two platforms. There is no actual terminus, as the line is continued into the Dockyard. Shortly before reaching Pembroke Dock station a branch is given off which goes to Hobbs' Point, but no passenger services are run over either of these lines.

The gradients of the section from Whitland to Tenby are somewhat severe, and the most difficult banks may be briefly summarised as follows. From Whitland to Cold Blow Summit, between Narberth and Templeton, there are 1 mile of 1 in 50 and 2 miles of 1 in 52 up; thence 1 mile of 1 in 49 and half a mile of 1 in 52 down. Beyond Saundersfoot there is half a mile of 1 in 103 up to Holly Bush Summit, followed by 1 mile of 1 in 47 down into Tenby station; beyond which the line drops at 1 in 62, and thence onwards to Pembroke there is nothing worthy of special remark.

Tenby as a watering place dates back to the days when seaside holidays were only regularly taken by the privileged few. The resorts mostly favoured in those days by the aristocracy and those who could afford to pay the somewhat prohibitive charges of travel and accommodation which were then in vogue were Weymouth, Scarborough, Whitby, and Tenby. Those who know these four towns will recognise, without any difficulty, the characteristics which are common to all, and which clearly indicate their early assumption of the title, in its best sense, of a select and fashionable watering place.

To-day Tenby caters for all classes of visitors, and, though a fairly large place, accommodation is apt to be scarce during July and August, so that early application for rooms is advisable.

The remains of the Caste, which is built on a promontory, and the north and south bays remind one forcibly of Scarborough, and the quaint houses and winding streets in the older portion of the town are also reminiscent of the famous Yorkshire watering place. The varied characters of the two bays, together with the resultant choice of outlook, enable the visitor to suit himself to all the changes of sun, wind, and weather. The sands are of great extent and of very beautiful character and colour. Shells in great and varied abundance may be found on them at low water. Within easy distance there is much wild rocky coast, and in places there are caverns to explore. Owing to the strongly contorted nature of the strata the whole district is full of interest to the geologist.

Steamers from Bristol, Cardiff, etc., call at Tenby on their way to Weston-super-Mare and Ilfracombe, and local excursions are frequently run to places of interest in the neighbourhood. Sea fishing, either from the Victoria Pier or from a boat, attracts many visitors, and good catches are frequent.

Inland the country is pleasantly undulating, and there are numerous villages and churches to delight the rambler. The archæologist will revel in the profusion of castles, manor-houses, and old houses which are scattered in profusion over the county, and which has earned for Pembrokeshire—as well as South Wales—the title of "The Country of Castles."

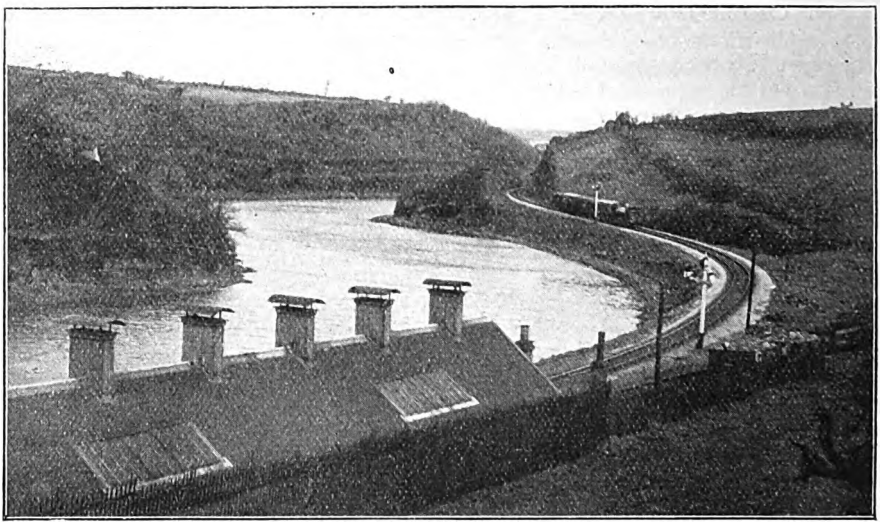
From its unique situation as regards its triangular seaboard, the atmosphere is rendered thoroughly marine, and by the action of the limestone the air enjoys a well-deserved reputation for dryness and purity. The temperature at Tenby, even

Digitized by Google

in mid-winter, is warmer than that experienced at Torquay, while during the summer months it is somewhat lower.

The municipal history of Tenby dates back to very early times. Henry IV. gave a Royal Charter to the town in 1402, authorising the appointment of a mayor and corporation. Fortunately, these were not swept away by the Reform Bill. The present occupant of the mayoral chair is Mr. W. H. Thomas, whom the present writer desires to thank heartily for many kindnesses shown.

From Paddington to Tenby *viâ* the Severn Tunnel is a distance of 249¾ miles, and this is covered, without change of carriage, in about 5 hr. 50 min. in the summer and 6 hr. 35 min. in the winter



Photo] [*D. Bowen & Son.*

APPROACHING MILFORD HAVEN.

months. A post close to the station shows the distance as 274¾ miles, but this refers to the original route *viâ* Swindon, Gloucester, and Chepstow.

At Saundersfoot, about 4 miles from Tenby, visitors will discover that a line of railway runs through the chief street of the village and then opens out with tracks on each side of the harbour walls. This line is the property of the Saundersfoot Railway and Harbour Company. The rolling stock comprises 1 engine and 71 wagons. It is interesting to note that the gauge of the metals is 4 ft. The photograph on page 141 will give a good idea of the diminutive engine and the primitive looking wagons of this interesting little-known railway. Two of the miners' lamps are hung on the hand-rail running along the top of the saddle-tank.

No passengers are conveyed by the railway, and it is solely used for bringing the anthracite coal, which is mined at the Bonville's Court and Kilgetty collieries, down to the harbour. The anthracite coal which is obtained here is of a special quality, and is hard and smokeless. The best is bought by brewers in the South and East of England and used for malting purposes. Some goes to Cornwall and is used for smelting tin. A considerable quantity is sent abroad to France, Germany and the Baltic for domestic consumption. When there is a fair stock in hand Tenby and the surrounding districts have a chance of buying anthracite to burn instead of the usual soft coal.

The Great Western have a connection with the pithead by means of a siding leaving the main line near to Saundersfoot station. The total length of the Saundersfoot Railway is about 4 miles.

It is now time to briefly review that section of the South Wales Railway which extends from Whitland to the termini at Neyland and Milford Haven.

Directly after leaving Whitland, the Pembroke and Tenby branch turns off on the left-hand side, but it is about 2¼ miles before the junction of the Cardigan branch is reached, this being on the right-hand

Digitized by Google

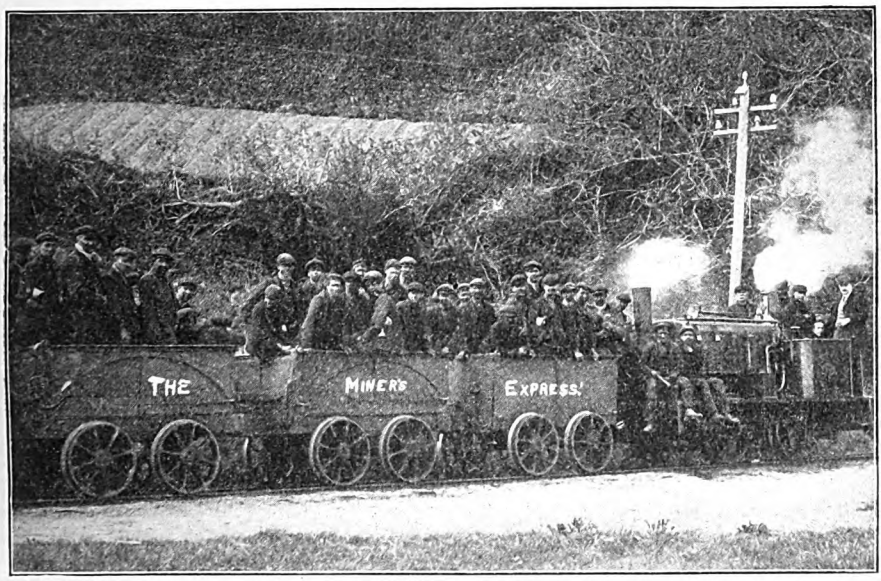
or northern side. Another 3 miles brings the traveller to Clynderwen, a pretty little station, clean and well kept. Like several other stations of the older type, the platforms are not placed opposite each other. In this case the passenger from London passes by the complete length of the up platform before the train reaches the commencement of the down platform. It was formerly called Narberth Road, being situated some three miles from Narberth, but the opening of a station in Narberth itself by the Pembroke and Tenby Company necessitated a change of name. About a mile beyond Clynderwen, the Rosebush or Maenchlogog Railway turns sharply off, and makes its unlevel way over the Precelly Mountains to Letterston and Fishguard.

Clarbeston Road, the next station, is the junction whence the new and direct route to Fishguard leaves the old South Wales line. A new station is now being built on a site a little to the west of the old one, and, judging from appearances a few months ago, it should prove a useful and commodious structure. Just beyond, the line bears sharply to the left, and thence runs in nearly a southern direction over fairly steep grades to the interesting market town of Haverfordwest.

The ample space between the running lines and the general spaciousness of the layout both point to the fact that the station is on broad gauge territory, and that it was built under its auspices. Photographs given last month enable this to be realised in some degree. Station buildings and covered accommodation must not be included under the head of spacious or extensive, for in early days this was always restricted, and little thought was given to the provision of comfortable waiting rooms or shelter.

Haverfordwest is a fine old town, with a broad main street, which, by means of a graceful stone bridge, crosses the river known as the Western Cleddau, and leads steeply up to the parish church. On the summit of the hill, and towering above the roofs of the houses which creep up on each side, are the ruins of the Castle founded in the twelfth century. Within recent years it served as the town gaol, but is not now used for that purpose. There appears to be a likelihood that the Corporation will shortly adapt the building for municipal purposes. Haverfordwest is a county within a county, as it has its own Lord Lieutenant, Sheriff, Assizes, and Corporation, the latter dating back into early history.

The Great Western Railway now maintains a daily motor service between Haverfordwest station and St. David's This remote Welsh Cathedral has always been rather inaccessible, being situated at the extremity of a sea-bound peninsula, and separated by a hilly district from all towns



Photo] [*H. Mortimer Allen.*

"THE MINER'S EXPRESS," SAUNDERSFOOT RAILWAY.

Digitized by Google

of any size or importance. Haverfordwest is, in fact, the nearest town, large or small. The intervening distance is 16 miles, and it is stated that there are 17 hills to be encountered on the journey. Many of these are long and steep, and the narrow road winds sharply. In the olden days access to St. David's was considered to be such a hazardous undertaking that two pilgrimages to the shrine of that city were accounted equal to one made to Rome. In the company's motor which climbs the steep hills slowly but surely and safely one does not experience many trials. Possibly the worst one is the endeavour to correctly recognise and locate the seventeen hills, for, with the exception of about half a mile—where the road runs almost on the seashore and slightly beneath the level of the beach—it appears to be nothing but a rising and falling track over the whole route.

The Cathedral, small but beautiful, and uniquely situated in a hollow or cup, will, of course, be the chief object of attraction to visitors, but the country around and the grand rock-bound coast and cliffs will well repay careful exploration. Visitors to Tenby or Haverfordwest should certainly undertake the pleasant modern pilgrimage to this quaint cathedral city of St. David's.

On Mondays, Tuesdays, and Saturdays it is possible to do the journey from Haverfordwest to St. David's and back in the day, as the car leaves the station at 11.15 a.m., is due at St. David's at 1 p.m , and returns thence at 2.40 p.m. There is a daily service from St. David's at 8.45 a.m. A second service is given each Monday, Tuesday, and Saturday by a car leaving the station at 6 p.m. On Wednesdays, Thursdays, and Fridays the only departure from Haverfordwest is in the afternoon at 3.10 p.m. This is the service which is in force throughout the autumn and winter months, but additional cars are run during the summer season.

It may be of interest to note that the South Wales line was opened to Haverfordwest in January, 1854; to Neyland, April, 1856; and to Milford Haven in 1865.

Resuming the journey, it is a run of nearly 5 miles to the quiet little station of Johnston. Most of the stations in the district have been more or less rebuilt within recent years, and modern ideas have been adopted.

Johnston is the point whence the single branch line is given off which runs to Milford Haven. The view on page 140 will give a good idea of one of the pills or creeks which here lead into, and indeed form part of, the extensive waters of Milford Haven, that most remarkable inland harbour. The building in the foreground is the Great Western engine shed.

The service on the branch is maintained by a three-coach train, hauled by a six-coupled saddle tank, and this works between Milford Haven and Johnston, some trains running to Haverfordwest and making the connection at that point.

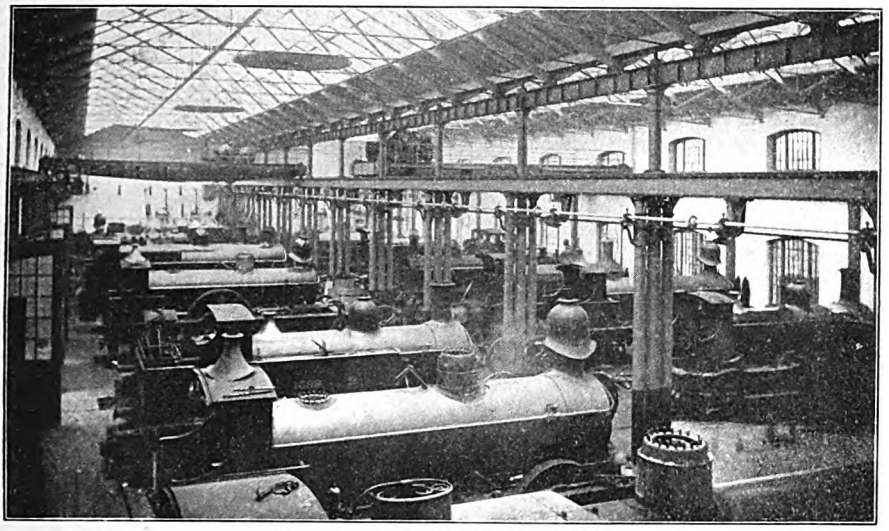
From the station at Milford Haven the line leads on into the docks, and thence to the Milford Haven Docks and Railway, the terminus being on a quay on the north bank of the Haven.

Fish is brought by the trawlers to Milford Haven in great quantities, and despatched thence by the Great Western to all parts of their system. A large number of fishing boats of varied types make this port the base of their operations, owing to the facilities, natural and otherwise, which are here found. This, to a large extent, accounts for the transfer of the greater proportion of the once famous fishing fleet of Tenby from that delightful town.

Returning to Johnston, the route lies forward through pleasant country for some 4½ miles to the terminus of the South Wales Railway at Neyland, formerly known as New Milford. From the station a covered way leads to the quay, whence the boats used to depart for Cork and Waterford. The opening of Fishguard has, of course, diverted this traffic, and the whole place now wears a dejected and forlorn appearance. The wooden station buildings appear to be the original structures, though at a later date a new platform has been erected. This is outside the original covered station, and is used for the up service, the down trains arriving at what was formerly the departure platform.

Immediately outside is the Great Western Hotel, facing due south, most pleasantly situated on rising ground, and overlooking the broad waters of the Haven. It has now passed out of the hands of the railway company, and is carried on as a private enterprise.

Digitized by Google



ERECTING SHOP AT KENTISH TOWN.

Leaves from the Log of a Locomotive Engineer [No. XXIII.].

By ROBERT WEATHERBURN.

IN my last contribution I dealt with the preliminary stages of the railwaymen's strike, and the measures I proposed, and for which I obtained official sanction, to cope with the anticipated difficulties.

In order to guage the situation more thoroughly I determined, without loss of time or previous notice, to personally interview every driver and fireman under my control, as the situation was becoming hourly more critical. Without intimating the reason, every man coming on or leaving duty was brought in separately to see me, the pedigree book containing age, date of entering the service, etc., being placed alongside for reference.

The interrogation was substantially as follows :—

"I see you entered the service on such a date, and served so long as cleaner and fireman ; then you were promoted to passed fireman on such a date, and finally made driver in such a year ; giving a total of so many years service. Is that correct ? "

"Yes."

"Then I may fairly assume that your relations with the Company have been of a friendly character ? " "Yes." "Have you personally any complaint to make against the Company as your employer ? " The answer would be "Yes" or "No" as the man felt. If "Yes"—"Then, after so many years service, are you going to sever your connection or remain loyal to the Company ? "

This stage of the interview would produce "Yes" or "No," or probably some prevaricating uncertainty.

According to my knowledge of the individual, and his replies to my questions, I based my further remarks, usually saying as little as possible, that little being to the effect that I earnestly hoped they had taken into account those who were dependent on them. In nearly every case it was easy to discriminate by the style of answering.

The affirmative or negative replies were duly put down on a list as "For" or "Against" the Company. To the undecided I gave more attention, and as forcibly as possible pointed out the unwisdom of strikes and the folly of being influenced by irresponsible leaders. In many cases it had the desired effect of winning over, or producing a feeling of uncertainty, if not apprehension. Each man after the interview, was escorted to his duties, or off the ground as the case

Digitized by Google

might be, without giving him an opportunity of communicating with his fellows.

This system of isolating them had the best effect possible, for beyond their own mates they could not obtain any information as to how the canvass was going. For instance, the first seven or eight men interviewed were unequivocatively against the Company; then there were several to the good, and many who desired time to consider; but as I assured them it was imperative to know in order to fill their places if required, the perverse or hostile were unmasked at once before their time, and the wavering were forced to a conclusion, which in many instances I found to be the opposite to what they had professed.

The interviewing was of the utmost value to me in many ways, and I am most thoroughly of the opinion that had it been conducted on the same lines throughout the system, at least one half the trouble, expense, and misery, would have been saved; and the strike would have resolved itself into a mere flash in the pan. Men who had posed as advisers of the most inexorable type were as wax, seeking by subterfuge and calumny to excuse their action, or, even worse, by unsolicited betrayal of their cause. Others, generally those who had been led, were, on the contrary, as honest in their mistaken determination to abide by the consequences, happen what might.

Thirty hours of uninterrupted interviewing gave me a list so antipodal of human stability and strength as would have served a student of morals for a lifetime. My position was now calibrated to a nicety, and I felt confident of the London end; but knowing that other districts would require help, I proceeded to Stratford to interview Mr. James Holden, the Locomotive Superintendent of the Great Eastern Railway. On my sending in my card I found that gentleman engaged, but intimated my intention to wait. As time was of the utmost importance my impatience was great. At last, after a second inquiry, I was coolly informed that Mr. Holden had left Stratford for Liverpool Street station. I hurried to the station in order to follow him. A train was just leaving and I jumped headlong and breathless into the nearest first class compartment, and found that the one other passenger was Mr. Holden himself. I knew full well that he had given me the slip in order to avoid any entanglement, but I at once solicited his help, as I knew that the Great Eastern Railway always kept a large reserve of passed men on hand. He at once expressed his desire not to be mixed up in the impending strike, but I represented forcibly that we were really fighting the battle of the other Companies, and if such help was not forthcoming and we should lose, that their turn would inevitably come. Before we arrived at Liverpool Street I had his instructions to go back and see his assistant, Mr. Glaze, and obtain all the men who would volunteer. My offer, as authorised, was "constant work at the full price." I did not leave Stratford until I saw progress. I was advised that a considerable number had agreed to come. Other intimations of a similar kind were also forthcoming from the Southern Lines, and in answer to my inquiry as to what I should do with them, I was instructed by Derby to send them there by an early morning train. Thus the first blow was delivered by the aggrieved party, but not before the strike had become recognised as inevitable. The men were duly dispatched and their advent at headquarters struck the first dire note of apprehension amongst the hitherto confident malcontents.

Whatever the effect might be, it was too late to recede, and probably the effect was minimised by the thought that it so far only affected two places, London and Derby, and that to a limited extent, whereas the whole system of 1,300 miles had to be dealt with. Nevertheless the blow had been delivered at the centre and its effects were felt more or less throughout the whole system.

On Thursday night, the 5th of August, 1887, the well thought out, yet ill-matured strike, took place. It produced no shock with us, for we were expectant and well prepared. Every officer was on duty, every man who could be relied on was held in readiness. A man stationed on the roof of the highest shed was instructed to give notice where and when fires were pulled out. The night mail was duly despatched from St. Pancras, much to the chagrin of a large concourse of strikers and sympathisers. The early morning trains were dispatched to time.

That night, and the following day and night, found us as busy as possible; testing eyesight, and examining the credentials of the numerous applicants for service. Such as were found eligible and ready, were at once relegated to duty, our own

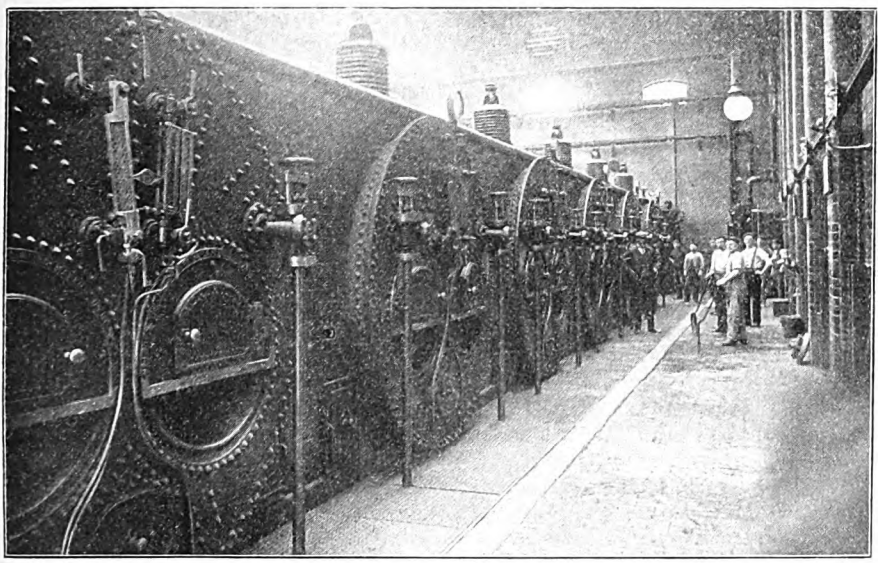
Digitized by Google

needs being considered first. Applicants who had come from distant places were supplied with passes and letters, and dispatched to other depôts.

Taken generally, the number and quality of the men who applied, were a surprise; several first class men who had served on Indian and Colonial railways availed themselves of the opportunity of being installed on so well known a Company. Discrimination was, however, necessary, and a number were refused whose credentials or physical condition were not satisfactory.

Telegrams requesting help nevertheless poured in from other and distant stations, and although our own position was hourly improving I knew the pinch was being severely felt at other depôts. However, one important advantage had been gained; the express passenger service had been maintained and that, too, with little delay. The stubborn opposition at the Childs Hill depôt, where not a single goods train was worked, out of the fifty or sixty daily booked from there, gave me some concern, and during the Saturday night I matured a plan to deal with them. Every passed fireman who was qualified received orders to meet me on the Sunday morning, when I announced my intention of making them all drivers at the full rate of pay. This inducement, coupled with the assurance that there was no doubt of the result, as it was only a question of time, removed all disinclination where such existed, and the men were forthwith entrained in the breakdown vehicles and conveyed to Childs Hill, thus at one move relieving the tension there.

One of the most irritating features of this great dispute was the false bulletins issued by the press, which were nearly all, with two or three notable exceptions, describing the attitude of the men as most uncompromising, and indulging in very pessimistic opinions of the Company's prospects. In the House of Commons, several members of Parliament, no doubt with a view to notoriety, openly advocated the interference of the Board of Trade, before some dreadful disaster befell the travelling public, as the trains they asserted were being driven by incompetent men.



BATTERY OF BOILERS FOR ELECTRIC LIGHT INSTALLATION, KENTISH TOWN.

These circumstances materially helped to prolong the difficulty. As reporters for the evening papers were in the neighbourhood and generally picking up the views from the strikers, I gave them an invitation to sit in my office, and judge the position for themselves. They heard the instructions given, saw for themselves the process of enrolment, and the testing of the applicants. I laid the working programme before them to judge for themselves whether it was worked to.

This had the desired effect and with the

Digitized by Google

exception of one evening paper, the hard fact was realised that the Company was more than holding its own in the South. There still remained a big gap to be filled up at the other stations, and relaxation was not thought of for a moment. I determined therefore to visit the London and North Western depôts at Chalk Farm and Willesden, but the officers at both places regretfully informed me that they could not help me in a similar manner to the other lines, without instructions from Crewe. At my solicitation they wired headquarters and great was my disgust when informed that the only help they could give was to carry Midland goods over their rails. Notwithstanding, I secured a few men of their training through the good services of personal friends.

In the earlier stages of the strike it was realised that official telegraphic instructions were well known to the men who had surreptitiously obtained copies from either the instrumentalist, or some sympathisers among the clerical staff. In order to prevent this tapping of the wires circular instructions were dispatched from the divisional superintendents, prohibiting the use of the Company's instruments, and instructing us to use the Post Office telegraphs instead. Whilst complying with these instructions, the thought struck me that a violation might do more good than harm.

Therefore, on my own responsibility, I sent a general message to all depôts, through the Company's instruments, informing them that if men were required they had better apply to Kentish Town, leaving the leakage to do its work of undermining the confidence of the strikers. The message did good service, inasmuch as it caused many who who were in a state of funk to offer their services, with regret for the part they had taken.

Some may be inclined to question the ethics of such a procedure, but those who do so should first, as Charles Reade says, "Put yourself in his place," and secondly realise the true sense of the message, which left very much to implication. I was called upon to give a personal explanation as to why I had disregarded the special instructions in this case, but a moment's consideration of my object and the effect produced were sufficient justification.

When the strike seemed to be inevitable, I purposely put myself in the way of several of my old Leicester drivers, and succeeded in persuading many to be loyal; with others, I was not so fortunate. One I do not readily forget, who after hearing my advice replied: "I am sorry for you, Sir, as I know for a certainty you will feel it more than anyone else, for you will not be able to work a single city train." Afterwards, poor fellow, he could hardly look me in the face.

The quiet non-active men among them were the men who never flinched in their sense of duty to their fellows. Such men, after the strike was over, took to reduced positions with a fortitude and quiet heroism that could not help but win regard and eventual restoration when the opportunity afforded.

A most singular feature of the after-effects of the strike struck me. The only lamentable accidents that occurred after the huge alterations and changes in the personnel were not with the new men, but with the old ones who had been taken on again. It seemed as if their moral and physical perception to danger had been blunted, and the two cases, one of serious mutilation, the other of sudden death, resulted entirely from an utter disregard of the most ordinary and simple precautions as well as forgetting, or ignoring, rules and regulations they had been taught to observe for years. Of course, the introduction of several hundreds of new men into the service rendered general reinstallation impossible, nor would it have been politic or desirable, as, though thoroughly beaten, many still nursed resentment which would have proved of future evil to the Company.

I desire here to say that no contest was more sharply waged, and none with less *vae victis* on the part of the Company. The men who came into work were cold-shouldered for a time by the older hands, but gradually, in the course of years, mistrust and resentment gave way to better feeling, and, were it not that the old forces are still silently and insidiously at work, sowing discontent, would ultimately die out. How much misery and pecuniary loss was caused by this strike will never be known. Fortunately the South American and Australian railways gradually assisted in absorbing the unhappy derelicts, thus minimising what would otherwise have been an unmitigated disaster.

The account given may be found fault with on the grounds that it is one-sided and the rights and wrongs have not been gone into, but for those inclined to this view, and wishful for further investigation I would recommend the data which should

Digitized by Google

be in the archives of the two Societies mentioned for their perusal.

The first and great mistake was the selection for hostilities of what was generally acknowledged to be one of the most satisfactorily worked railways in the kingdom, where the conditions of service, taken throughout, were in advance of other companies. In their ambitious desire to prove their precedence, to pose as champions of the railway men, they over-estimated the mouthy enthusiasm, and the fulsome report produced, never taking into account or properly appraising the under currents and back waters of uncertainty which always exist more strongly in old communities than younger ones. Nor did they take the large and more human side into account, with the consequent loss of confidence whichever side should be victorious.

The paid agitator, or society official, is, unfortunately, not popular with the more ardent and aggressive spirits, unless he can show something for his money. In this strike and one which afterwards occurred in Scotland, there were the adventurers and office hunters who are always on the alert for a subject involving popular pleading and bringing themselves more particularly under public notice; the principles involved being of a secondary importance.

Undistinguished members of Parliament, anxious to curry favour, seize such opportunities with avidity. In the House of Commons such chances were too good to be lost. I remember one gentleman, now high in government office, who did his utmost to assist and encourage the strikers, justifying his action by asserting that if anyone was justified to speak authoritatively of railway service it was himself, "*as he had resided for many years near to a large railway.*" Such agitators have nothing in common with the question at issue, beyond their own interests to serve, and are mostly responsible for untold misery and prolonged ill-feeling.

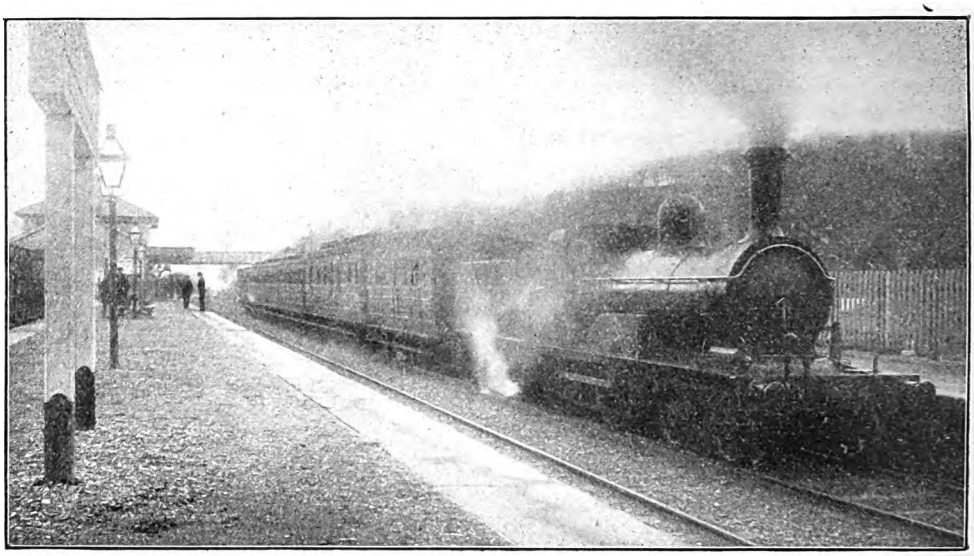
Trades Unionism, in whatever form it may take, is not nearly so strong on railways as the unions would wish the public to believe. Their policy is too socialistic to win the general sympathy and support necessary to success. In no phase or sphere of society is class distinction more strongly cherished than among railway men. It is not presumption to affirm that two-thirds value their membership for its friendly society features rather than its ulterior objects, and aims, and would, if called upon for aggressive action, be found unreliable. The men who have won their way, step by step, year by year, from the bottom grade to that of reliable and skilled drivers expect the juniors and inexpert hands to do the same as a necessary probation.

The same, with certain modifications, can be said of the artisan class. Quality must ever be the distinguishing ruling feature, despite the injunctions of the Unions. Every step is a class distinction, and happily breeds a pride of place. Even personal habits and taste form an unclimbable barrier to generalisation of views and action; then, outside of all these, there is a class of men who, like Jack of the Wynd in the "Fair Maid of Perth," insist on fighting for their own hand.

If railway officials were so minded they would soon realise the diverse and unmixable nature of the varied interests of the men they control, and by the exercise of a little tact and judgment neutralize the efforts of mischief makers.

(*To be continued.*)

Digitized by Google



Photo] [*H. Fayle.*

ENNISKILLEN TRAIN AT CASTLEBLAYNEY, 4-4-0 LOCOMOTIVE NO. 54.

The Castleblayney, Keady, and Armagh Railway.

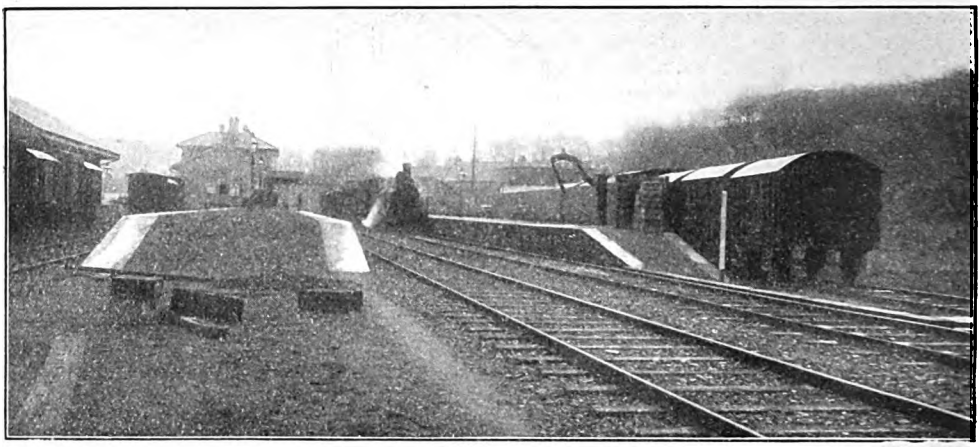
By H. FAYLE.

A RAILWAY following very nearly the same route as that now covered by the Castleblayney, Keady, and Armagh Railway, (worked by the Great Northern of Ireland Railway Company), was proposed as early as 1836. In 1836 a Royal Commission was appointed to inquire into the manner in which railway communications could be most advantageously promoted in Ireland. The only railway then open in the country was the Dublin and Kingstown, but several schemes had been authorised including the Ulster Railway from Belfast to Armagh. The Commissioners recommended the construction of a main trunk line from Dublin to Armagh, utilising the already authorised Ulster Railway for the completion of through communication between Dublin and Belfast. Their report further adds, in reference to a proposed scheme for a railway from Dublin to Belfast through Drogheda and Dundalk:—"We have to observe that it may be considered altogether in the light of a speculation, which has no reference to the internal commercial traffic of the country; . . . . the range of the Carlingford mountains between Dundalk and Newry presents an unsurmountable obstacle to the construction of a direct line of railway between these points."

The route recommended by the Commissioners passed through Navan, Castleblayney and Keady, but despite this the main line to Belfast was carried through Drogheda and Dundalk to join the Ulster Railway at Portadown. The construction of the viaduct over the river Boyne at Drogheda was the last link required for through railway communication between Dublin and Belfast, and this important work was completed in April, 1855. At that time the traveller between the two principal Irish cities had to pass over the lines of three separate railway companies, the Dublin and Drogheda, Dublin and Belfast Junction, and Ulster Railways; these were however amalgamated, along with some other lines, under the title of the Great Northern Railway (Ireland) in 1876. The Ulster Railway was opened from Belfast to Lisburn in August, 1839, to Portadown in October, 1841, and to Armagh in March, 1848; this line was originally constructed on the 6 ft. 2 in. gauge, but was altered to the standard 5 ft. 3 in. gauge in 1845. This railway was afterwards extended through Monaghan to Clones, the latter town being

Digitized by Google

Digitized by Google



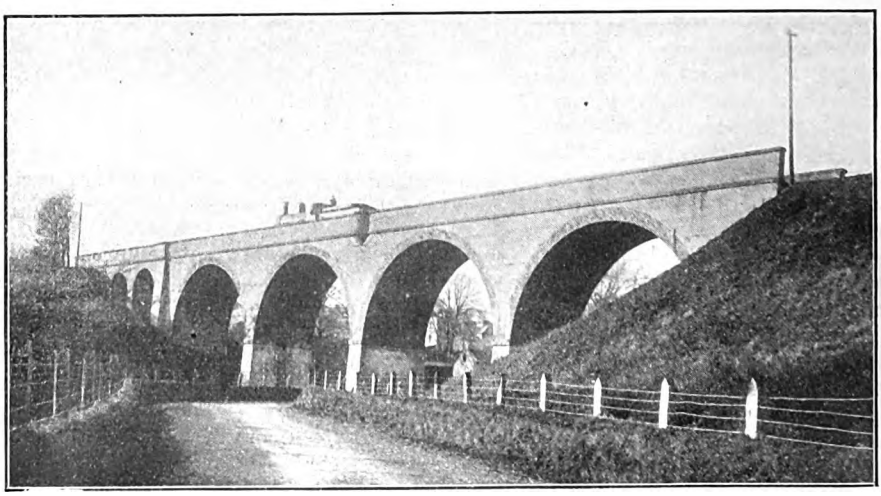
Photo] [*H. Fayle.*

CASTLEBLAYNEY STATION, SHOWING BAY PLATFORM ON LEFT FOR ARMAGH TRAINS.

Starting from a height of 350 ft. at Castleblayney, there is a fall for the first mile before commencing the continuous ascent to the summit level, 613 ft. above datum, which is reached 7½ miles from Castleblayney. From this point the line descends 469 ft. in the remaining 9¾ miles to Armagh; the steepest gradient is 1 in 70, nearly 2½ miles being on this slope, while nearly 6 miles are at gradients of 1 in 90 or 91. The sharpest curves are of 20 chains radius, the longest straight stretch being rather less than half a mile. The line is 18 miles 6 chains in length, and is single throughout; there are three intermediate stations at Creaghanroe, Keady and Milford, and four "halts" at Carnagh, Tassagh, Ballyards, and Armagh (Irish Street). There are two electric staff sections, from Armagh to Keady, and Keady to Castleblayney.

Owing to the broken nature of the country traversed, extensive cuttings have been necessary in many places, while there are three large bridges at Keady, Tassagh, and Milford. The Tassagh viaduct is the most important, and is a stone arch bridge with eleven openings.

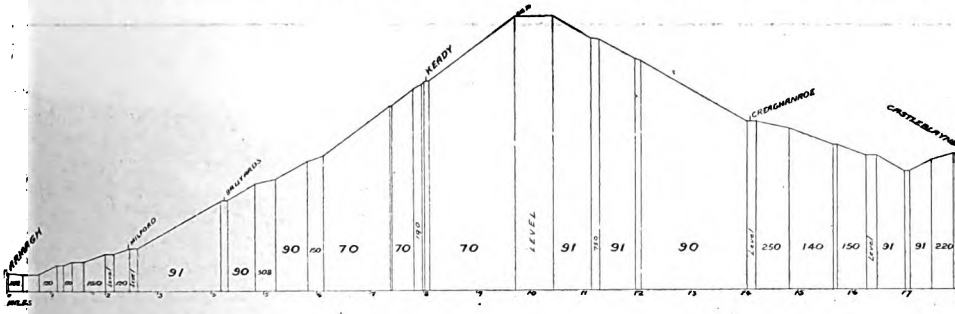
The line was opened for traffic between Armagh and Keady towards the close of 1909, but the remainder to Castleblayney was only completed in 1910. In consequence the Great Northern Railway now has three routes between Dublin and Armagh, the longest, is *viâ* Dundalk and Portadown, the distance being 97½ miles. The shortest



Photo] [*H. Fayle.*

VIADUCT AT KEADY.

Digitized by Google



GRADIENT PROFILE: CASTLEBLAYNEY, KEADY AND ARMAGH SECTION.

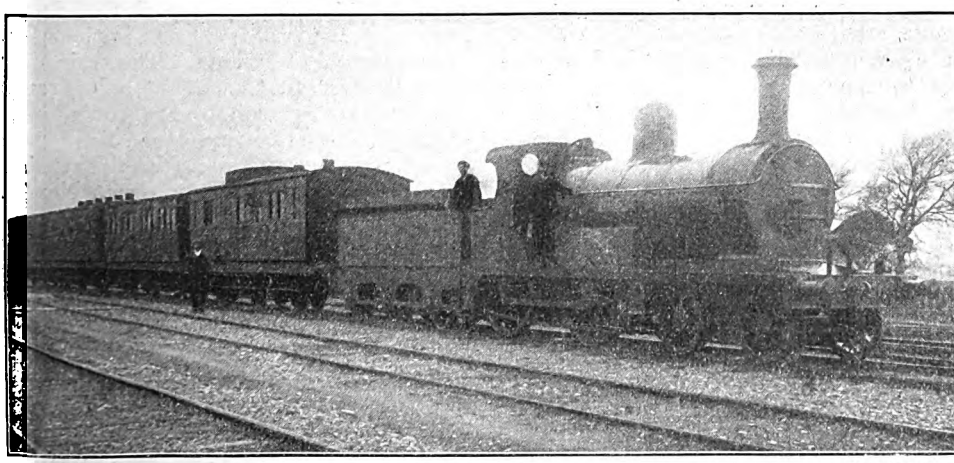
and most usual route leaves the main line at Goraghwood Junction, the distance being 89 miles. By the new route, *viâ* Dundalk and Castleblayney, the distance is 90½ miles, though at present the train service is arranged more to suit local conditions, than the through traffic.

It will be unnecessary to allude to the journey over the Great Northern main line from Dublin to Dundalk. Dundalk is one of the most important junctions on the system, and the station, rebuilt some years ago, is most conveniently arranged. There is one long island platform accommodating up and down main line trains, with two bays at the southern end, used by branch line trains to Enniskillen and Derry, and the Dundalk, Newry and Greenore trains to Greenore.

The Dundalk and Enniskillen section of the Great Northern Railway is all single line, and provides an alternative and longer route from Dublin to Londonderry than the one usually followed *viâ* Portadown. Trains on this section are worked by the smaller 4-4-0 locomotives. After leaving Dundalk the line runs through a broken and sparsely populated country; at the first station, Inniskeen, a short branch is thrown off to the little market town of Carrickmacross. Eighteen miles from Dundalk the train reaches Castleblayney, a market town of 1,576 inhabitants, and the starting point of the new line.

The station here has been partly rebuilt, and a new bay platform provided on the down side (from Derry) for the Armagh trains; the junction is about a quarter of a mile from the station. At the time of the writer's visit, No. 61 *Hyacinth* a small 5 ft. 8 in. 4-4-0 was working the branch train, consisting of four six-wheeled coaches. No. 109 *Shannon*, a front coupled tender engine with outside bearings was working goods trains over the line.

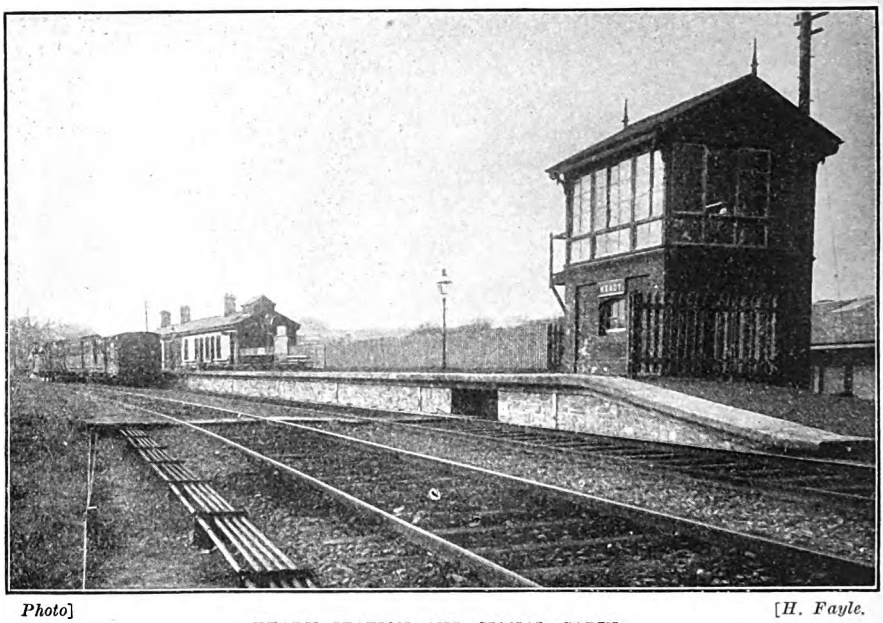
There are three through trains in each direction between Castleblayney and Armagh, in addition to others running



Photo] [*H. Fayle.*

TRAIN WORKING THE CASTLEBLAYNEY AND ARMAGH LINE, 4-4-0 LOCOMOTIVE NO. 61, *Hyacinth.*

Digitized by Google



Photo] [*H. Fayle.*

KEADY STATION AND SIGNAL CABIN.

between Armagh and Keady, on certain days only. Trains connect with up or down services on the Derry and Enniskillen route at Castleblayney, and with trains to Belfast at Armagh.

After leaving Castleblayney the line runs through hilly country with only a small population; the first station Creaghanroe, has, like all others on the line, a single platform and station buildings of wood. The line now ascends sharply, and we get some picturesque glimpses of the country before reaching Carnagh "halt," which takes its name from a large demesne adjoining.

The ascent continues through deep cuttings to the summit level, where a fair-sized lake may be seen to the left. The descent now begins, and the train curves round abruptly and passes over a large viaduct just before reaching Keady station (illustrated).

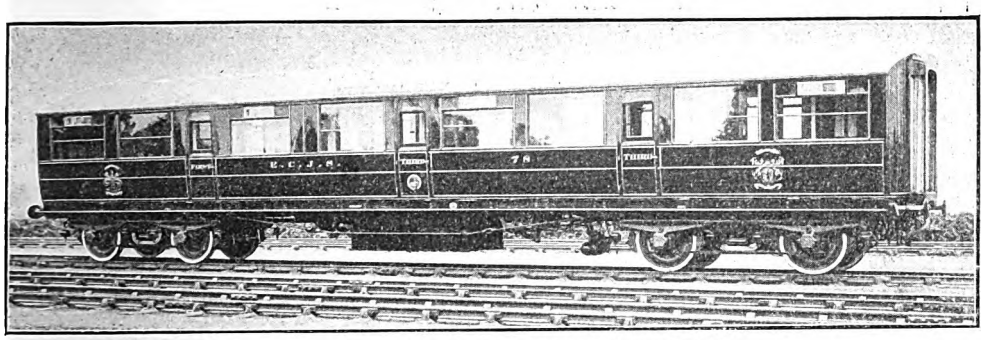
The town of Keady has a population of 1,466 and is picturesquely situated on rising ground; previous to the opening of the line the nearest station was Armagh, but more recently another new railway, the Newry, Keady and Tynan has been proposed, so that it is likely to become an important junction. There are some flax and woollen mills in the district between here and Armagh, and in two cases special sidings have been constructed to the mills.

There is quite a fair-sized goods yard at Keady, and no doubt the new railway is bringing increased prosperity to the town. The line continues to descend and a short distance beyond Tassagh "halt" the train crosses a fine stone arch viaduct; Ballyards "halt" and Milford station follow in quick succession. The train crosses two large bridges at Milford, and we get a view of Armagh, the imposing Roman Catholic Cathedral situated on an eminence being a prominent landmark. On another hill is the less imposing, but more ancient Protestant Cathedral. The city of Armagh has a population of 7,588, and is the ecclesiastical capital of Ireland. The train draws up at the Irish St. (Armagh) "halt," serving the southern portion of the town, and a short distance beyond the line curves round sharply and joins the Portadown and Clones section of the Great Northern Railway.

The junction is just south of Armagh station, which has two platform lines and a bay for the trains to Goraghwood. The provision of the "halts" on the new line has been much appreciated locally, and has considerably added to its utility; possibly the same experiment may now be tried on some of the other branch lines.

In conclusion it may be added that the new line has been very solidly constructed throughout.

Digitized by Google



FIRST AND THIRD CLASS COMPOSITE CARRIAGE.

New East Coast Joint Stock.

TWO new trains, embodying as near an approximation to all-steel construction as possible, have been built for working the 10 a.m. Anglo-Scottish services between King's Cross and Edinburgh and are now in service.

Each train consists of ten vehicles, with accommodation for 68 first-class and 225 third-class passengers, exclusive of the seats in the first and third-class dining cars. The total length of each train without the engine is 594 feet. In accordance with the standard practice of the "East Coast" companies, all the new vehicles are fitted with Pullman vestibules and central Buck-eye coupler.

The first-class restaurant car is of the single seated type, and is 58 ft. 6 in. in length by 9 ft. in width. Accommodation is provided for 28 passengers, 16 in the smoking and 12 in the non-smoking sections, the two sections being divided by a half-glass door, hinged to swing either way. The partitions and walls of the car are of dark polished teak. The seats are of the Adams' design, also of polished teak, the chairs being upholstered in green tapestry and the tables covered with green leather. Hassocks are provided.

The floor is covered with a rose-coloured carpet over a thick layer of felt. The floor itself is double and packed with hair felt to deaden noise. Further, india-rubber cushions are placed between the body and the steel underframe, which is carried on compound bolster bogies. The roof is elliptical in shape; the ceiling, which is of Adams' design, is painted white. Special attention has been paid to ventilation. The torpedo ventilators in the roof can be operated by the passengers by means of a small lever placed on the walls of the car. Brass net racks are fixed above each seat.

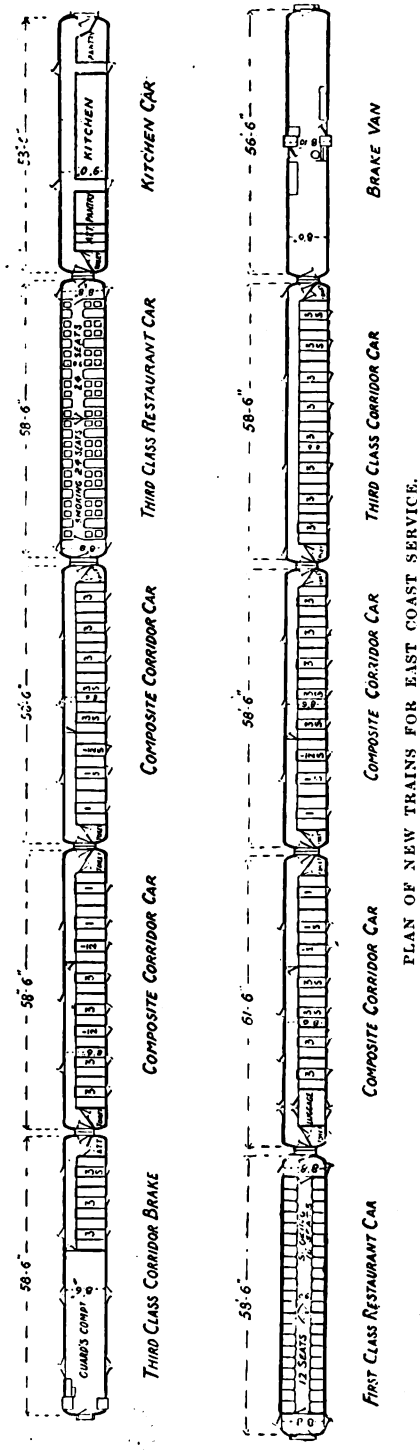
Large side windows, furnished with blue blinds and rose coloured curtains, are employed, and are fitted at the top with glass louvre ventilators. The window is raised and lowered by a lever placed close to the passenger's hand. At each end of the car are electric fans which revolve at varying speeds. Artificial light is provided by seven electroliers, each of four lights. These are of an entirely new kind for railway carriages, the light being transmitted through a translucent glass bowl on the well-known semi-indirect principle. During the cold weather the car is heated by steam through double pipes running each side and the temperature is regulated in the vestibule by the attendant.

The third-class restaurant car is also 58 ft. 6 in. in length and 9 ft. in width, it accommodates 48 passengers, equally divided into the two sections, smoking and non-smoking, the half-glass dividing door being hinged to swing each way.

Walls and partitions are of polished teak, with dado of hygienic oak matchboarding, with panels above in sycamore. Chair frames are of iron; the upholstery is in crimson and black velvet pile. The seats are of the "tip-up" variety with arm rests, and net racks are fixed above them. Tables have teak tops, covered with embossed maroon-coloured American cloth.

The floor is covered with plain cork, and the floor itself in other respects is similar to that provided for the first-class car. The roof is elliptical in shape and eight torpedo ventilators are fitted. There are eight large side windows, four in each section being fitted with glass louvre ventilators, operated by levers in a similar manner to the first-class car. The other four are fixed with standard

Digitized by Google



PLAN OF NEW TRAINS FOR EAST COAST SERVICE.

fanlights above, opening outwards. The blinds are maroon-coloured.

Electric light is provided by three-light electroliers, finished in black bronze and copper relief. The heating arrangements during cold weather are upon similar principles as the first-class car; electric bells communicate with the attendants.

Steel kitchen cars are quite new to the main lines of railway companies in this country, this being the first instance of their adoption. No doubt the employment of the cars will be watched with interest by many railway authorities and the travelling public. The principal dimensions are as follows:—length, 55 ft.; width, 9 ft.; width of corridor, 2 ft.

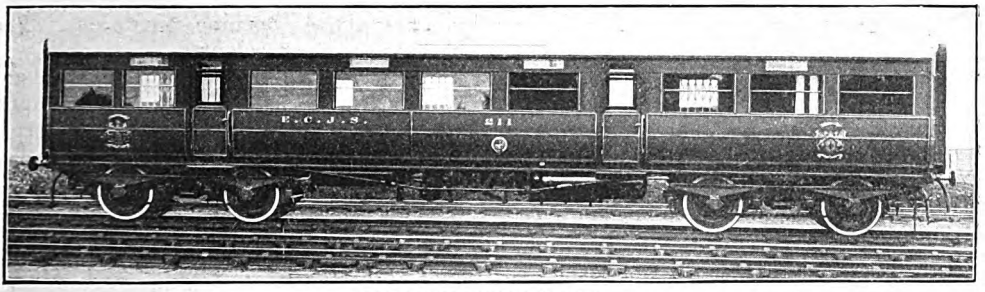
Regarding the general lay-out of the car, this consists of a central kitchen, first and third-class pantries which are placed at opposite ends. attendants' compartment and lavatory; and corridor running the whole length of the vehicle. There are in addition two transverse corridors which divide the pantries from the kitchen.

The coach is built entirely of steel and the tare weight is 36 tons. The frame is decked all over with a steel floor, this in turn being covered with a patent cement which is impervious to moisture; this cement is also carried up all round the sides and partitions with a rounded sweep, so that all corners are eliminated, and the car can be easily and effectively cleaned by washing down. The whole of the internal walls of the kitchen are lined with enamelled plates, these together with the special floor before-mentioned rendering this compartment specially hygienic and cleanly.

The kitchen is fitted with cooking stove and hot closet; patent hot water geyser, sinks, refrigerators, etc., the whole arrangement being most commodious and up-to-date in all respects. The two pantries are very similarly fitted up, and are complete with sinks, wine closets, glass, crockery racks and cupboards, water filters, etc. The whole of the car is effectively ventilated along the sides by means of glass louvre ventilators, in addition to a large number of torpedo roof ventilators.

Hot and cold water is laid on to all the sinks, the supply of hot water being obtained from a boiler over the stove, which is heated by the waste heat from the gas stove, the supply of water to this boiler being automatically regulated. The coach is mounted on two standard four-wheel bogies, and the general external appearance is

Digitized by Google



ALL-STEEL KITCHEN CAR.

similar to existing East Coast Joint Stock carriages.

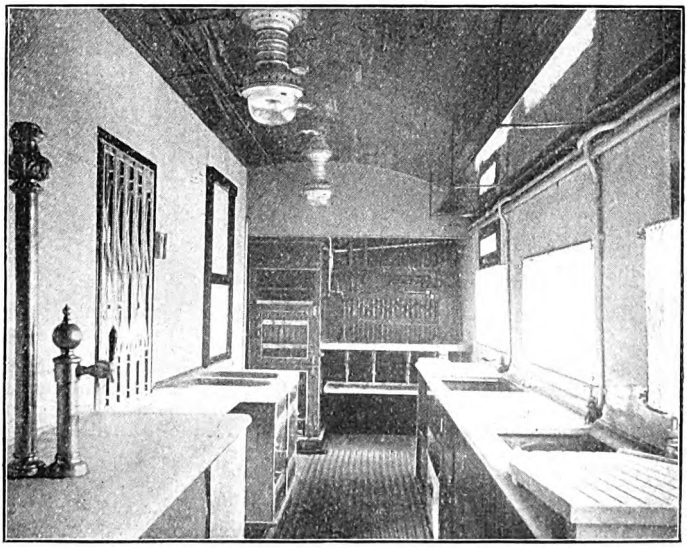
The composite vehicles follow the general standard practice of East Coast Joint Stock, but many modifications and improvements have been embodied. The principal dimensions are as follows:—Length, 58 ft. 6 in. and 61 ft. 6 in.; width, 8 ft. 6¾ in.; width of corridor, 2 ft. 2 in. The tare weight of each coach is 31 tons 12 cwts. Through corridors run the entire length of these vehicles, which are divided into first and third-class compartments, a commodious lavatory compartment being also provided at each end of the car, hot and cold water being laid on. The coaches are steam heated throughout and the temperature can be regulated at will by the passengers.

The body is framed in teak and oak, with teak external panels and mouldings. Floors are of double thickness, with felt between to deaden noise. The roofs are also double cased, the inner casing boards being afterwards covered with millboard. First-class compartments are in dark polished teak with a walnut finish. Seats are fitted with specially constructed cushions, with horse-hair stuffed cushion on top, made on the principle of a French mattress, the backs being made very comfortable by means of springs and padding. Flush closing arm rests are fixed, one in the centre of each seat back. Upholstering is in green leather in the smoking, and blue cloth in the non-smoking compartments.

Floors are covered with "Kork" lino, and rugs are provided in each compartment to harmonise with the upholstery. All the brass fittings are made plain and sunk flush with the finish wherever possible. Third-class compartments are finished in teak, with light oak hygienic casing boards fitted to side doors. Seats and backs are hair stuffed and spring fitted, the upholstery being in crimson and black velvet pile. The fittings are in black bronze with copper relief, the floors being covered with "Kork" lino.

Finish in the first-class corridor is in dark polished teak, with hygienic casing boards below the waist rail, and sycamore panels above. In the third-class corridor the finish is in teak framing with light oak hygienic casing boards below the waist rail, and sycamore panels above, the corridor throughout being also covered with "Kork" lino.

Ventilation of the compartments is effected by means of two torpedo ventilators in the roof, in addition to which hinged ventilators



INTERIOR OF STEEL KITCHEN CAR.

Digitized by Google

are fixed at the quarter lights on the body side, the door lights being also made to drop.

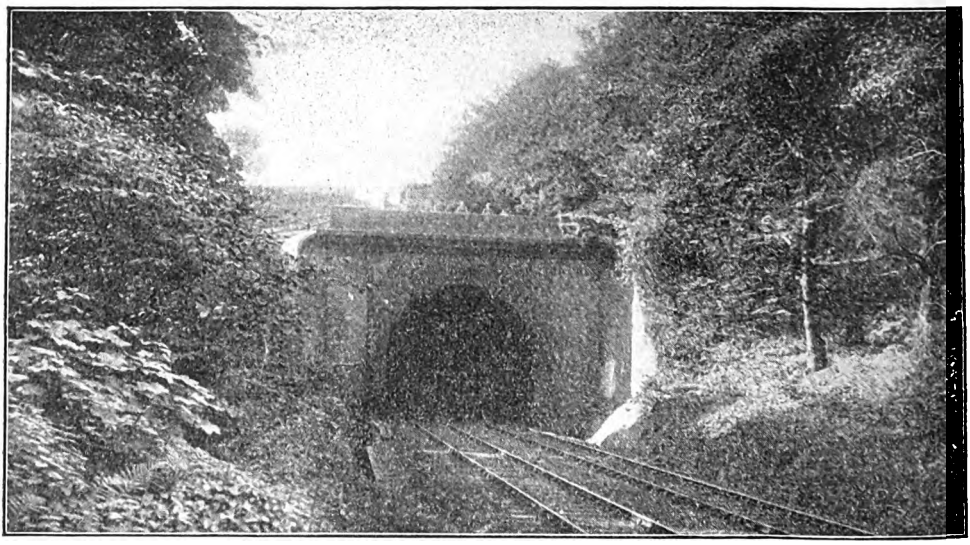
The vehicles are effectively lighted by electricity, with four lights in the first-class compartment, two being fixed on the roof, and two on the corridor partition; this latter fitting has a 3-way switch for "out," "dim," or "full." In the third-class compartment one group of three lights is fixed on the roof. The corridors are lighted by means of single light fittings.

Lavatory compartments have tiled floors with rounded corners, and white "Emdeca" covered walls, the ceilings being covered with millboard painted white; water seal w.c. is installed, also wash basins of white porcelain and marble.

The underframe is built entirely of steel and is mounted on two four-wheel steel bogies.

These trains have been constructed at Doncaster works (Great Northern Railway) and York works (North Eastern Railway), from designs by Mr. H. N. Gresley, Locomotive and Carriage and Wagon Superintendent, Great Northern Railway, and Mr. Vincent L. Raven, Chief Mechanical Engineer, North Eastern Railway.

Railways and the Picturesque.



Photo] [*W. W. Hollis.*

On several occasions extremely picturesque railway tunnel views have been referred to, and we are indebted to Mr. W. W. Hollis for another interesting photograph of this class, reproduced above. We invite readers to specify the railway and location of the tunnel shown. It is on an important main line belonging to a leading English railway company.

Digitized by Google

The London, Brighton and South Coast Railway in East Sussex.

By J. FRANCIS.

THERE is a tendency to concentrate attention primarily upon the main routes of our great railways and to neglect, except as far as they prove useful, the many secondary lines which as a rule constitute the major portions of the respective systems. In many cases, however, these secondary lines present quite as many features of interest as the trunk routes, except perhaps that they do not call for notable train schedules and therefore fail to appeal to express train and speed enthusiasts. But to the tourist and those concerned in scenic, historic, archæological, ecclesiastical and general exploration, these lines have much to offer. Indeed, in many cases, a journey over such lines is a pleasure in itself, as natural beauty is revealed, first on one side and then on the other, while the traveller who elects to leave the train here and there, or to concentrate his attention upon what a selected district has to offer, will be well repaid, not only from the point of view of tourist interest, but also in respect of the healthful results of a holiday spent in this way.

In the eastern portion of Sussex, served mainly by the series of lines which constitute our present subject matter, the London Brighton and South Coast Railway gives access to a wonderfully beautiful area, which may be recommended on the grounds set forth above. The northern portion is part of the Wealden forest area, and here is the scene of the iron industry, which once centred in Sussex, though now there is no suggestion whatever that this was at one period the "Black Country" of England. Instead, we find a series of railway routes traversing country which still contains portions of Ashdown and other forests of early English history, which presents wonderful views of wooded hill and dale, and which provides an abundance of material of historic and tourist interest. And as one travels further south, and verdured undulations, some of them of considerable height, give place to the beautiful but relatively bare slopes of the south downs, the change accentuates, rather than disturbs, the pleasurable impressions created by the earlier stages of the journeys involved.

Approximately the area covered in our present study is that bounded on the north by the Three Bridges–Tunbridge Wells lines, with consideration of the approaches thereto from London, the main lines from Three Bridges to Polegate, and the Tunbridge Wells–Polegate branch, with the intervening lines. This includes the Ashdown forest area, a portion of the Sussex Weald, and in the south the fringe of the downs which characterise the south coast of England.

Apart from the Brighton and Hastings main lines, which constitute the western and southern boundaries from Three Bridges to Polegate, the earliest of the branch lines was that from Polegate to Hailsham, constructed at the same time as the Eastbourne branch and opened on May 14th, 1849.

The first important incursion into the area under review was the completion of the Three Bridges–East Grinstead line (6 miles, 52 chains), opened July 9th, 1855. Then on October 18th, 1858 the Lewes–Uckfield branch (10 miles, 74 chains) was opened for traffic. It is worthy of note that at that date this branch connected with the main line from Keymer Junction and entered Lewes at an altogether different place to where it does now, the present arrangement being covered by the Lewes and Uckfield Junction line (3 miles, 44 chains), opened August 3rd, 1868, and subsequent improvements at Lewes.

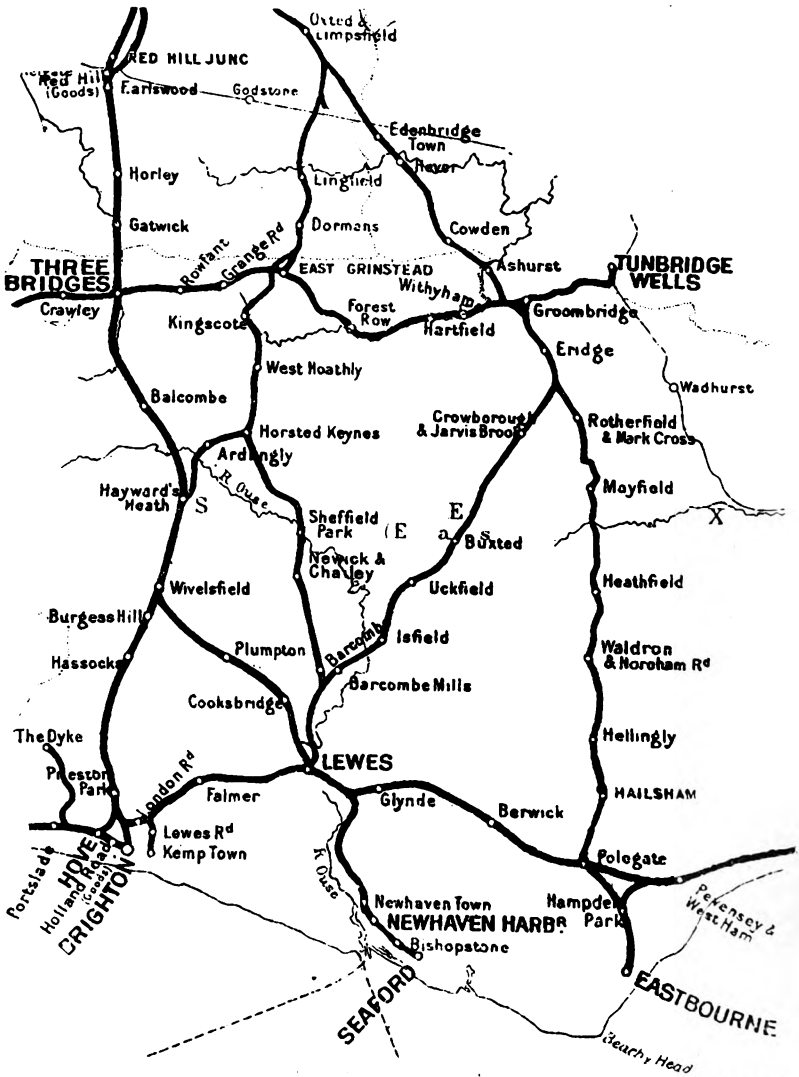
The next link is the Tunbridge Wells group of lines and connecting links. On October 1st, 1866 the railway was completed from Tunbridge Wells to Groombridge, and from Groombridge to East Grinstead, to connect with the branch from Three Bridges. On August 3rd, 1868 Uckfield was connected with Groombridge

Digitized by Google

(12 miles, 19 chains), thus giving a through route from Tunbridge Wells to Lewes and Brighton. Then, on May 18th, 1871, the short extension line (52 chains) was made between the Brighton and the South Eastern stations at Tunbridge Wells.

Remaining developments relate mainly to the 'eighties. On April 5th, 1880 the

On August 1st, 1882 the new line from East Grinstead to Culver Junction (17 miles 11 chains) was completed, thus connecting East Grinstead with Lewes, and a month later the 4 miles 55 chains from Horsted Keynes to Hayward's Heath were added. Then in 1884 the northern lines were added giving access to these



LONDON, BRIGHTON AND SOUTH COAST RAILWAY BRANCHES IN EAST SUSSEX

original branch to Hailsham was extended to Heathfield (7 miles, 54 chains), and in September of the same year the link from Heathfield to Redgate Mill Junction (8 miles, 31 chains) was also completed, thus giving direct connection from Tunbridge Wells to Polegate and Eastbourne.

branches independently of the main line—from South Croydon to East Grinstead (Low Level), a distance of 18 miles 63 chains, opened on March 10th, together with the spur whereby trains can enter the High Level station at East Grinstead. The spur to the South Eastern station at Eden-

Digitized by Google

bridge was also built at this time. Included in the powers under which these lines were constructed was also the spur from the East Grinstead line to Eridge, so as to avoid the necessity for going into Groombridge before proceeding further south. This was actually made, but only on June 7th of the present year was it brought into use for traffic under the name of the Ashurst direct line. During the intervening years it has been used largely as a storage line for engines and vehicles waiting their turn for repair; but the development of traffic has now justified its utilisation, and the visitor to places south of Tunbridge Wells benefits accordingly.

In 1888 the remaining link, from Edenbridge to Ashurst Junction, giving a direct line to Groombridge and Tunbridge Wells, was brought into use, thus completing the system of lines which now exists, and which may now be considered in detail.

It will be seen that the route from South Croydon to East Grinstead is of later date than most of the Sussex lines referred to, while the direct Edenbridge—Ashurst Junction route was the last of all to be added. Both routes are exceedingly picturesque, as the Caterham Valley is traversed high up on the slopes and overlooking the South Eastern Caterham Valley branch, while onwards through Oxted, Edenbridge and Cowden, or *viâ* Lingfield and Dormans to East Grinstead, the beauties of the Surrey hills and valleys are revealed from the carriage windows in very picturesque fashion.

Beyond Cowden the border line is crossed and Sussex entered, while East Grinstead is just within the latter county. The whole of the Three Bridges—East Grinstead—Groombridge route is in Sussex, but after touching Sussex between Cowden and Ashurst, the now most direct route places Ashurst station in Kent, then diverges into Sussex, so that while Groombridge station is in that county its original village—as distinct from the new residential quarter which has grown up around the station—is in Kent, and to reach Tunbridge Wells station Kent is again entered by the railway. Otherwise all the lines under review are well within Sussex, and give access to districts which are noted for characteristic Sussex scenery, either wooded and undulating or pertaining to the South Downs.

Ashurst is a two-platform roadside station of ordinary design, but laid out in accordance with the neat style of architecture typical of most of the Brighton stations in this district. It has now attained the dignity of a junction and division station, as several of the trains rearranged for the summer timetables now slip the Tunbridge Wells coaches or divide at Ashurst. Additional lines have been laid down to meet the new traffic conditions, as up trains have to be joined, and an engine bay is necessary for division purposes on the down side.

The actual junction is some distance further on, and connection is first made with the line from East Grinstead at Ashurst Junction box, before the Ashurst spur, only

GROOMBRIDGE STATION.

Digitized by Google

GENERAL VIEW OF TUNBRIDGE WELLS STATION.

now brought into use though constructed over 20 years ago, is put off. This spur is a simple two-track section of road, calling for no special remark, except on account of its usefulness. It joins the Uckfield branch at Birchden Junction.

Just before reaching Groombridge station from Ashurst the Uckfield line comes in, and the station has an island platform for up trains, with small refreshment room, with an ordinary platform for down trains. Onwards to Tunbridge Wells the halt to serve the High Rocks may be noted. At Tunbridge Wells there is a relatively large station with an island platform on the up side, while on the down side there is one long platform, with a bay used for London, Brighton & South Coast Railway rail motors at one end, and a bay used by the South Eastern & Chatham Railway trains at the other. Otherwise the running lines are continued through the station towards the South Eastern & Chatham Railway, and for shunting and traffic movements London Brighton & South Coast Railway trains and engines work at both ends. The station buildings are remarkable for their neat architecture, with refreshment rooms, etc., surmounted by an artistic clock tower. On one side of the station is the engine shed and on the other the goods yard and depôt.

Returning to Groombridge, the southern branch may first be followed. The spur from Ashurst comes in, as already mentioned, at Birchden Junction, and a mile or so further on is Eridge station, with two island platforms, refreshment rooms and other accommodation on a scale which one hardly looks for here.

The station is a convenient centre for many excursions. There are several groups of rocks of the same class as those at High Rocks, Eridge Castle, and several places of scenic interest. At this station a few trains are now divided, if they come *viâ* the Ashurst spur, one portion for each of the branch lines south thereof.

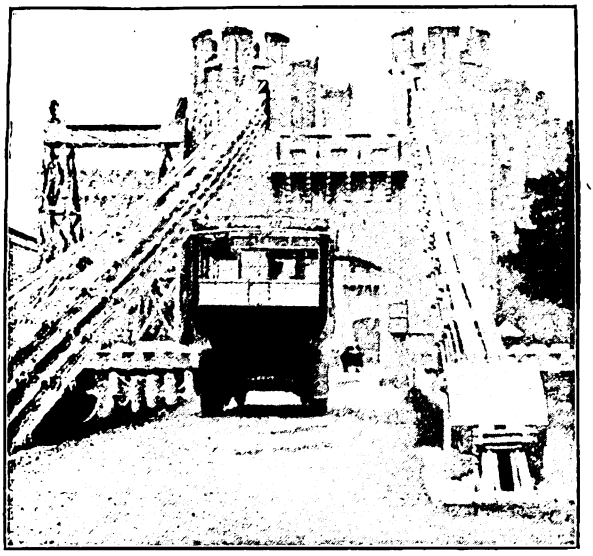
At Redgate Mill Junction the Hailsham and Polegate branch diverges to the left, and is then single track throughout. It is stated, and the writer is certainly not inclined to dispute this claim, that this is the prettiest section of the whole of the Brighton system, notwithstanding that so many other portions approximate very nearly to the same standard.

The line winds about, with heavy grades and numerous speed restrictions for curves, sometimes in cutting, then on embankment or high up on the hilly slopes, giving magnificent views over hill and valley, with parts of Ashdown Forest to lend scenic interest here and there.

Rotherfield, the first station, is noted for its church, and is a fairly important place on the outskirts of Ashdown Forest. Mayfield is a smaller place, but is more visited as containing much to interest both the artist and the antiquary, with its old-fashioned cottages and gable roofs, examples of Elizabethan architecture, and the "Palace," said to have been built by St. Dunstan, and now used as a Roman Catholic nunnery. The station itself is a very pretty erection located on a curve, and adorned, like may others in this district, with well cultivated platform flower gardens.

(To be continued.)

Digitized by Google



The Road Motor Department of the London and North Western Railway.

Photo] ["*Commercial Motor.*"

CROSSING THE SUSPENSION BRIDGE AT CARNARVON.

IN conjunction with officials of the London and North Western Railway, a highly instructive inspection trip has been made by "The Commercial Motor" of the road motor services in connection with the "Premier" line.

It is pointed out that the motor is no longer only an interesting and more or less doubtful accessory to railway methods; it has made good its claims to a proper place in the time-table; and it has enabled the Directors already to find a means to accommodate the pressing needs for the better travel of inhabitants in territories rightly belonging to the railway, but hitherto divorced from it physically.

After something like nine years of persistent experiment, the London and North Western Railway has at last decided that, not only is the motor vehicle a possibility, but that in its present efficient form it is an actual necessity. A railway company has facilities as well as problems which are unique to it as a trading concern. It has a huge existing mechanical organisation, numberless depôts, and a vast staff, which includes specialists in almost every line of business. These are factors which enable it to tackle the problem of the economical employment of motor vehicles in an altogether different manner to that which has to be employed by any newly-established operating concern.

It is obvious that a railway company, in order successfully to make use of the commercial motor, must evolve its own means of doing so. It would be foolish to attempt to establish a department as part of a railway company's system, and yet to organise it on lines similar to those employed by the London General Omnibus Company. With all the facilities which such a concern possesses, one would naturally conclude that any great new movement like this, in its early stages, would encounter only problems which could be easily solved, and yet it has to be remembered that the difficulties, as a matter of fact, are correspondingly unique. Of necessity there are no huge concentrations of vehicles at any particular points. The motor department has to maintain, on the contrary, a great number of small services, all of which are accessory to the railway at various parts of the system, and many of which are in the most isolated areas, cut off from the central organisation, from repair shops and fully-equipped garages in all but the fact that the main railway connects them effectively and brings them into more or less close touch.

As organised at present the principal centres of the motor department are at London, Watford, Birmingham, Manchester, Leeds, Mold, Llandudno, and Holyhead. But, of course, the whole scheme is now in process of development, and it is to be

Digitized by Google

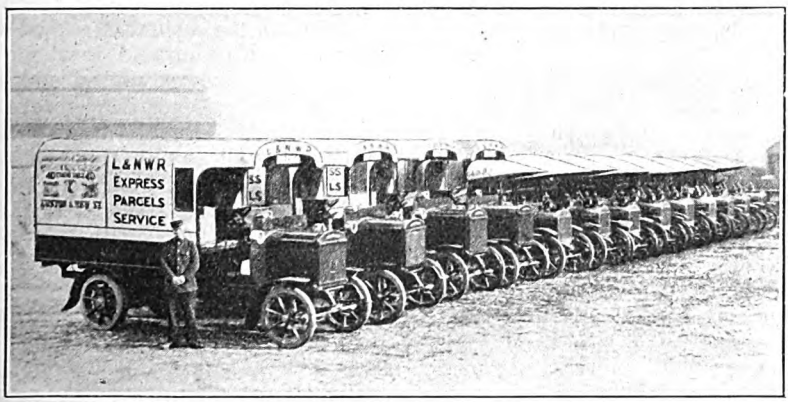
Digitized by Google

Photo] ["*Commercial Motor.*"

TRANSFERRING A LOAD OF BUTTER FOR DIRECT DELIVERY TO A BIRMINGHAM SUBURB AFTER ARRIVAL BY TRAIN AT CURZON STREET GOODS DEPOT, BIRMINGHAM.

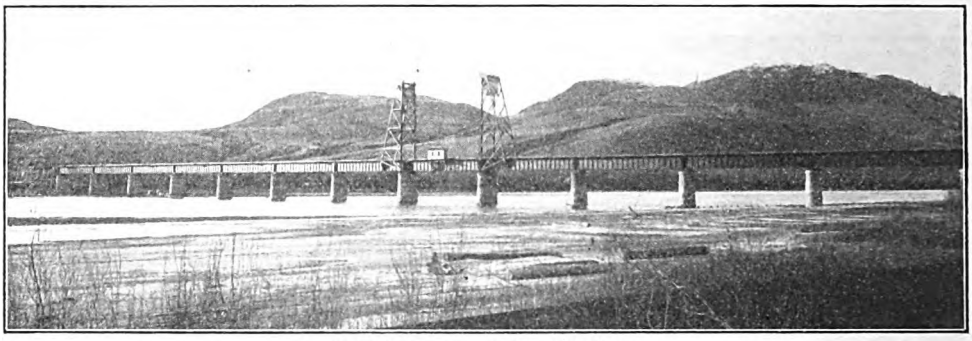
tants in a great many areas look solely to certain railway companies to afford them facilities for transit both for passengers and for goods. But in not a few instances, not only with this company but with others, it has been found almost impossible, on the score of expense, or perhaps for other reasons, to do as much for these districts as the directors would desire, with the facilities at hand, before the commercial motor became something more than an interesting, and at first a very expensive experiment.

On the arrival of the practicable, self-propelled vehicle of industrial type, however, they were not slow to realize that, once the experimental stage had been passed with this new class of mechanism, in much the same way as it had been passed successfully by the locomotive, it would be possible to afford isolated and often remote districts adequate facilities which they had without doubt long sought. So that, even in cases where the profits arising from passenger carrying by motor vehicle have not been such as would tempt private companies looking to their fare receipts for their sole source of possible dividend, the railway company is able to step in and, as part of its universal scheme for the provision of travelling facilities, to weld on to one or other of its terminal points or intermediate centres a system of proper road vehicle services.



FLEET OF THORNYCROFT MOTOR VANS IN GOODS AND PARCEL SERVICE AT BIRMINGHAM.

Digitized by Google



CANADIAN NORTHERN RAILWAY.

Lift bridge over the Thompson River at Kamloops, with approach viaduct.

A Remarkable Vertical Lift Bridge on the Canadian Northern Railway.

By HENRY T. DENISON.

AT Kamloops, British Columbia, the Canadian Northern Railway has recently completed a remarkable girder type lift bridge across the North Thompson River. This bridge, which is 1,209 ft. long, with approaches aggregating 1,123 ft. additional, is unique in Canada, as it is the first bridge in the Dominion having a vertical lift span. It was designed by Messrs. Waddell & Harrington, Consulting Engineers, of Kansas City, Mo.

The lift span, consisting of a 93 ft. deck plate girder, weighing about 236,000 lbs, is balanced by counter-weights, attached to cables which pass over sheaves at the top of the towers. There are four $1\frac{1}{4}$ in. cables at each corner, and on the span side, equalizers are used to distribute properly the load to each rope. The span is guided along the sides of the front tower columns during its movement, the guides being constructed so as to allow proper movement at the expansion end under temperature and live load changes. The counter weights are likewise guided along the sides of the towers. Centering castings are used at the ends of the span, to ensure proper alignment when seated. These castings also take the thrusts from the load.

Special rail castings are used at the ends of the lift span, to give continuity to the rails at these points when the bridge is down, and at the same time locks are provided for each end of the bridge. The span is raised and lowered by means of cables, fastened at the top and bottom of the towers. These cables pass over drums at each corner, actuated by a system of gears and shafts, connecting to a gasoline engine at the centre. All the machinery is below the deck except the operating levers and indicator, which are located in the operator's house, supported at the level of the deck from the side of one girder. A limit switch is used in the igniter circuit to cut off the engine after the span has passed a certain point in both its up and down movements. Contacts are likewise placed on the clutch lever so as to control the igniter circuit in conjunction with the limit switch. A hand brake is installed with the machinery for manual control of the engine. Most of the machinery is enclosed between the girders, just below the deck at the centre of the span, and is accessible from the operator's house by means of a stair and door through one of the girders. Hand operation is also provided for. The machinery is designed to lift the span 53 ft. in 100 seconds, providing a clearance of 55 ft. above high water.

Though the Kamloops bridge is as yet the first of its type in Canada, the St. John and Quebec Railway will erect a similar one across the Oromocto River near Fredericton, South New Brunswick. There are only two other bridges of this type as yet in operation in America. One over Pond Oreille at Sand Point, Idaho, and the other over the Pig Choctaw Bayou in Louisiana. The latter, on the Louisiana and Texas

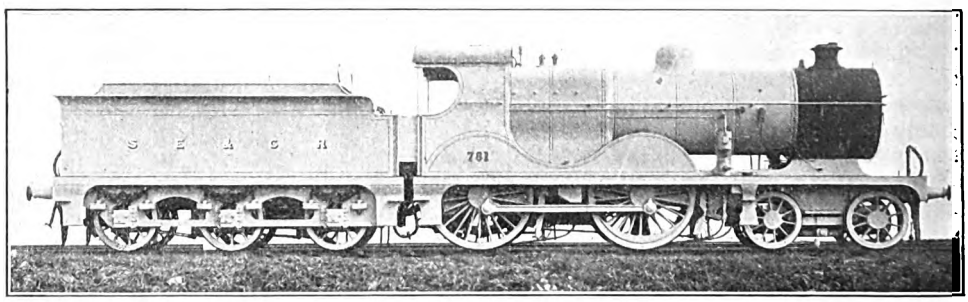
Digitized by Google

Digitized by Google

but it is now made public that they will not only have station and yards, but also shops on property secured from the British Columbia Fruitlands Company, about a mile distant from the west end of their bridge. The Railway Company it is stated, have not only obtained all the land they need, but in connection with the Fruitlands Company, will, at an early date, lay out a town site south of the tracks with shops on the north. In due course this new town will become part of Kamloops, which is only separated from it by the South Thompson River. This will then become one of the principal divisional points between Vancouver and Edmonton, while the branch line from the Okanagan district will also be operated from there.

NEW EXPRESS LOCOMOTIVES: SOUTH-EASTERN AND CHATHAM RAILWAY.

Designed by Mr. R. E. L. MAUNSELL, Chief Mechanical Engineer.



THESE new 4–4–0 locomotives have been built in Germany, at the works of Messrs. A. Borsig of Tegel-bei-Berlin. In many respects the design is a development of Mr. Wainwright's largest class, the specification having been prepared under the oversight of Mr. R. E. L. Maunsell Chief Mechanical Engineer. Schmidt superheaters are fitted in conjunction with draught retarders in place of damper mechanism. Nos. range from 772-781. Although built in Germany, it is interesting to note that they have been constructed strictly to English drawings, and that fittings and details have been supplied by British firms, while inspection has been carried out by Messrs. Rendel, Palmer & Tritton, on behalf of the South Eastern and Chatham Railway. The Company's standard steam reversing gear is fitted, while the bogie and other details correspond with usual practice on this line.

Principal dimensions are as follows:—

Heating surface—Firebox	160 sq. ft.	Weight on coupled wheels	37·7 tons
Tubes	1,252 ,,	Weight in working order—	
Total	1,412 ,,	Bogie	19 tons 15 cwt.
21-element Schmidt superheater	319 sq. ft.	Driving	19 ,, 5 ,,
Grate area	22·5 sq. ft.	Trailing	18 ,, 9 ,,
Working pressure	160 lbs. per sq. in.	Total	57 tons 9 cwt.
Cylinders	20½ in. dia. 26 in. stroke	Total weight engine and tender	97 tons 15 cwt.
Coupled wheels	6 ft. 8 in. dia.		

Digitized by Google

PERTINENT PARAGRAPHS

New Railway Knights.

OUR congratulations are offered to Mr. W. S. Wright, Chairman of the Hull and Barnsley Railway and Mr. Albert H. Stanley, Managing Director, Metropolitan District Railway, etc., upon whom His Majesty has conferred the honour of knighthood. Both gentlemen are well known in railway circles, and this evidence of royal recognition may be considered a compliment to the railway transportation world. Sir William Wright joined the Board of the Hull and Barnsley Railway in 1896 as representing the corn and seed trade, and was appointed Deputy-Chairman in 1900, and Chairman in 1907, on the resignation of Mr. William Trotter through ill-health. He is a son of Sir William Wright, who also received the honour of knighthood in connection with dock enterprise in Hull, and the Sir William Wright Dock recalls to the citizens to-day that father, like son, did his share in developing the port.

Sir Albert H. Stanley is Managing Director, Underground Electric Railways Company of London, Ltd., Metropolitan District, London Electric, Central London and City and South London Railways and the London General Omnibus Co., Ltd. He was born at Derby in 1875, but at an early age went to America, where he became General Superintendent of the Detroit United Railway and General Manager of the Public Service Corporation of New Jersey. In connection with the reorganisation of the Metropolitan District Railway, he was selected to be Manager, and later full executive control of all the railways and associated transport agencies operated by the Underground Electric Railways Company of London, Ltd., was vested in him.

* * *

Is Cheap Travelling Desirable?

ONE would consider that the policy of the railway companies in providing cheap and convenient travelling facilities for those to whom ordinary rates are too costly and for attracting traffic which would not be available at all under other conditions, is beyond question. Yet, a correspondent to *The Times* seriously suggests that "if the railway companies, instead of carrying trippers at a farthing a mile or less, with enormous expenditure on advertising and unremunerative competition amongst themselves, were to combine and agree that the minimum fare should be a halfpenny a mile, or better still a penny a mile as fixed by Parliament, then profits would certainly be increased. The workers, whose wages are constantly being raised a little, would either spend more to go the preposterous distances which they now travel—say Lancashire to Bournemouth—or would spend the same as at present to go half or a quarter the distance—say to Blackpool—with much greater benefit to themselves and less expenditure, if only on coal, to the railway companies." It is difficult to discuss such an attitude seriously, but now that people have developed the "travel" habit, a reversion to earlier methods would be almost suicidal. By adopting the alternative of a standard halfpenny a mile the railways would be robbing themselves of the ordinary traffic, which is, after all, by far the largest factor; and there would even then be a need for special facilities. Gentlemen such as the writer of the letter in question fail to realise that cheap facilities create traffic, not only of corresponding kind but also of a more valuable character. There is, in fact, relatively little competition, as the word used to be understood, between individual companies. Each railway or group of railways has to hold its own; but it is safe to say that the generous and plentiful provision now made would not be supplied unless it justified itself. Moreover, this policy may justify itself indirectly as well as directly.

* * *

Do Cheap Fares Pay?

ARISING out of this correspondence, Mr. Whateley C. Arnold asks whether it is sufficiently realised that within certain limits the lower the fare the greater the net profit. In support of this contention, he argues "(1) that the cost of hauling a full train is practically no more than that of hauling an empty one; (2) the expenses of permanent way, stations, signal-boxes, and establishment charges are not appreciably increased by running a dozen or more trains in addition to one; and (3) when there is a regular service of trains, say, from London to Torquay, stopping at Reading, the cost of carrying a passenger from London to Torquay is in effect no more than from London to Reading." But he omits to consider that it is not a usual practice to run a long train of nearly empty vehicles, so that with a few passengers a short train will suffice, while a full train usually means a heavy one, and there is then a very appreciable difference in the cost of running. Moreover, more trains on the line mean more wear and tear of the track, additional engines and train staff on duty, even if there is no increase in station and signalling staff, while the mere fact

Digitized by Google

that vehicles are run from London to Torquay, instead of from London to Reading, entails that only limited service can be had from each. It may be possible to convey passengers as cheaply from London to Torquay as from London to Reading, but the former train will only make about two journeys, and the latter a dozen in the course of a day's work. In practice the situation has to be viewed in a spirit of compromise. Cheap fares and special facilities create travel and, therefore, cause business which would not otherwise be had at all. But the principle of universal cheap travel, if carried very far, would only strangle traffic which is not sufficiently voluminous to justify special rates which can only pay on a large scale, including a great deal of the traffic which is mainly responsible for railway earnings.

* * *

High Speed near London.

A CURIOUS query is raised by a reader as to whether trains approaching London can maintain speeds of 60-70 miles an hour within a radius of 10 miles from the Metropolis. Apparently he has the impression that there is a speed restriction against fast running near London. That trains nearing the Metropolis must be well in hand, and ready for the complications of suburban and like traffic is quite correct; but where conditions are favourable, and junctions and other factors do not call for speed restriction, there is no need for seriously slackening until much closer in. Thus at Harrow (L. & N.W.R.), Southall (G.W.R.), Surbiton (L. & S.W.R.), Chadwell Heath (G.E.R.), New Barnet (G.N.R.), Elstree (M.R.), and other places, as well as certain stations even nearer the terminus, there is no reason why full speed should not be maintained. It was, indeed, claimed by the late Mr. Rous-Marten that he once came through Willesden Junction at 78 miles per hour, while we have seen a record suggesting, though on rather unsatisfactory data, about 90 miles per hour through New Southgate. But through busy junctions and complicated areas high speeds are generally prohibited, and on railways such as the London, Brighton and South Coast a radius of 10 miles may preclude high-speed running almost entirely, or at any rate anything over about 50 miles per hour. It is a case entirely of circumstances and conditions.

* * *

East Coast Train Services.

IN a recent issue of *The Times* a correspondent dilated at considerable length upon alleged deficiencies of Great Eastern Railway train services. Apparently his principal complaint was in reference to the relatively long journey times between London and Norwich, Ipswich and Cambridge. He acknowledged that Great Eastern main line traffic is "distinguished by its punctuality and in a lesser degree by its frequency," but at the same time lamented that there is "very little in the way of speed." The various train services were then analysed; but to anyone familiar with the character of the traffic involved, his deductions are far from convincing.

In a letter to the Editor of *The Times*, Mr. J. F. Gairns, Editor of the RAILWAY MAGAZINE, wrote:—"The supply of fast trains is only part of a railway company's business, the main requirement being to meet the needs of the system as a whole, at the same time satisfying special demands as favourably as possible. Your contributor bases his facts upon the over-all times between London and important centres, and his statements may be accepted as a ground for argument. What he does not point out in several instances is that the over-all times are relatively slow because of intermediate stops. . . . If there were a real demand for non-stop trains all the year round no doubt the company would have provided them long since. . . . The fact is that a great deal of Great Eastern traffic is of an intermediate character. That is, from London a proportion of the passengers go considerable distances; but the majority travel only part of the way, or change to a branch line, while other passengers entrain en route for further journeys. . . . The mere fact that, with a fastest time of 71 minutes, the average of 21 trains between London and Cambridge is 81 minutes, suggests that Cambridge is very well served rather than the reverse."

Other letters were also published pointing out that the 5.5 p.m. express from St. Pancras is also non-stop to Cambridge. The old subject of Cambridge station was also again raised, and a few days later, a correspondent quoted a letter to show how little control the University had in early days, as follows:

Cambridge, 1 May, 1851.

Sir,—I am sorry to find that the Directors of the Eastern Counties Railway have made arrangements for conveying foreigners and others to Cambridge on *Sundays* at such fares as may be likely to tempt persons who, having no regard for Sunday themselves, would inflict their presence on this University on that day of rest. I should be obliged, therefore, by your making it known to the directors that such arrangements as those contemplated by them are as distasteful to the authorities of the University as they must be offensive to Almighty God and to all right-minded Christians.

I have the honour to be, Sir,
Your obedient servant,
(Signed) G. E. CORRIE,
Vice-Chancellor of the University.

The writer of the article which started the discussion had, however, a good word to say on behalf of Great Eastern Continental arrangements. He considers that the Great Eastern Railway "is seen at its best in everything pertaining to its Continental traffic. Passengers are not charged a supplement for the use of the restaurant cars, and the arrangements for transferring them from train to steamer and *vice versa* are excellent. The cross-country boat trains between York and Harwich also deserve

Digitized by Google

THE METROPOLITAN COMPANY'S STAND AT THE ANGLO-AMERICAN EXPOSITION.

a word of praise, as with a good many stoppages and longish waits for connections they perform a journey of 218 miles in 5½ hours. Altogether this is the most liberal and best managed Continental traffic of any in the kingdom."

* * *

Railway Exhibits at the Anglo-American Exposition, Shepherds Bush.

THE Anglo-American Exposition at Shepherds Bush is not primarily concerned with railways, so that the exhibits shown by railway companies are secondary; but as far as they go they are exceptionally interesting. Views of three of the stands are reproduced. The Metropolitan Railway shows a signal post with electrically operated upper quadrant starting and repeating arms and fitted with controlling gear, so that every minute or so first the starting and then the repeating arm are raised, and then both are lowered, so as to obtain the conditions of signal operation. An illuminated diagram is also included, and this operates to show the passage of trains, as occurs in an actual installation. Other exhibits include transformers and electrical devices used on the line, while there is a good advertising display, both inside and outside the stand.

The London and North Western Railway shows several interesting items. Queen Adelaide's saloon is constructed with glass front on the "observation car" principle, and contains sleeping berth and dining room; indeed, though built so long ago, the resemblance to the present day First Class carriage is really remarkable. The model of a composite coach of the latest type is quarter size of the actual vehicle and is accurate in scale and every detail. The arrangements for cooking and the excellent accommodation of the dining saloon and sleeping cabins may assuredly be said to represent the last word in the comfort of railway travel. The contrast between early engines and these now made is emphasised by the full-sized reproduction of the famous *Rocket* of 1829 and the scale model of the *Coronation* engine No. 5000. An appreciable proportion of passengers by the London and North Western Railway system know the line well as a usual route to Ireland. The fleet of steamers belonging to the Company which ply between Holyhead and the North Wall, Dublin is entirely new within the last few years, and here may be seen a beautiful model of the *Scotia*, the latest addition to this service of boats.

The London and South Western exhibit includes a fine scenic model of the line, models of steamers and advertising material. The Furness Railway stand is mainly pictorial, but is very complete and interesting. Messrs. Vickers, Sons, and Maxim show, with other items, an installation of Vickers Single Battery Train Lighting System. A most interesting feature of this system is the automatic control whereby the widely fluctuating voltage due to the variation of the speed of the train is controlled within extremely narrow limits. The plant on the stand is utilised for driving several fans and also for purpose of illumination, thus demonstrating the capabilities of the system. With Vickers system 50 per cent. less cells are required, and therefore 50 per cent. saving in cost of upkeep is effected.

Digitized by Google

The dynamo does the work and not the battery. The Pneumatic Railway Signal Company's stand is largely occupied by an upper quadrant three-position signal and equipment, and details of low-pressure pneumatic, electro-pneumatic and electric signalling appliances.

The Great Eastern Railway exhibit is of an altogether novel character. Part of it consists of a reproduction of the hall of an old 14th century house still existing in Norwich, and known as the "Strangers' Hall." Ascending a narrow flight of steps, through a low oak door the visitor enters the hall and is back five hundred years. Not a sound of the city enters. A sort of green twilight comes through a facing door, between the deep bay window and the staircase and minstrels' gallery, and through it you catch a glimpse of trim ancient lawn, and grey walls. The place has no exciting story. The dark groined crypt served no worse purpose probably than the storage of valuables. On this 14th century foundation was built, by well-to-do burgesses doubtless, the old English home we see to-day with the additions and varied handiwork of many worthies through five centuries. With such a quiet domestic record the name Strangers' Hall seems out of place. But it does not disturb the uneventful story. Used in the 18th century as the Judges' lodgings, occupied later by an Italian sculptor, and still later by a banished priest who taught George Borrow Italian, it is, perhaps, as a residence of these "foreigners" that so insular a home took its present name.

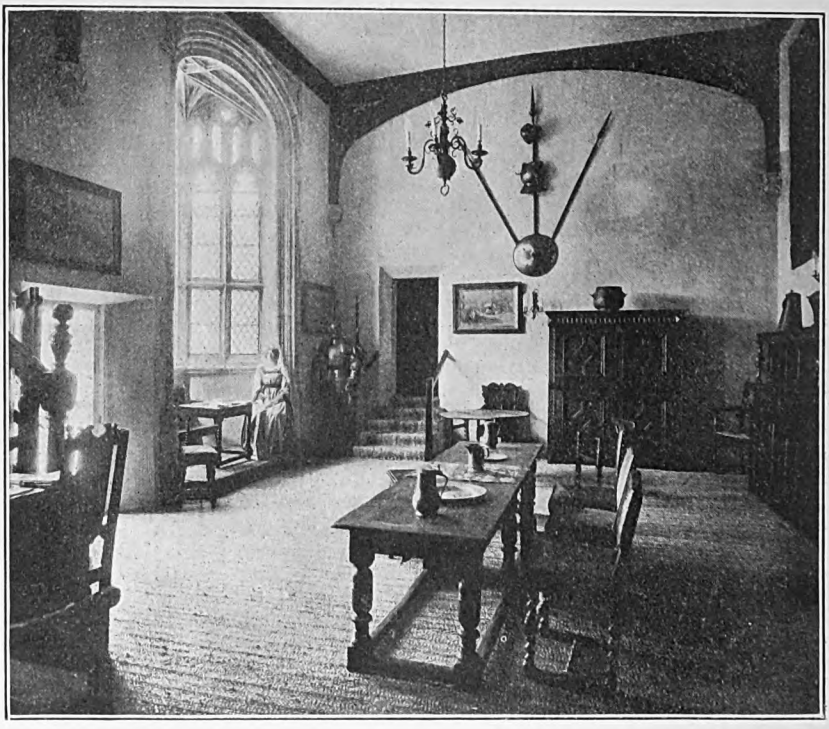
A lady in attendance is dressed in a costume of the period. Adjoining is a representation, to scale, of the head of the saloon staircase, several cabins and a portion of the exterior of one of the Great Eastern Continental steamers, with two Dutch girls in attendance.

Remaining exhibits are mainly of a detail or pictorial character; but the Southern Railway (U.S.A.) has an effective display of agricultural and fruit products of the districts which it serves.

* * *

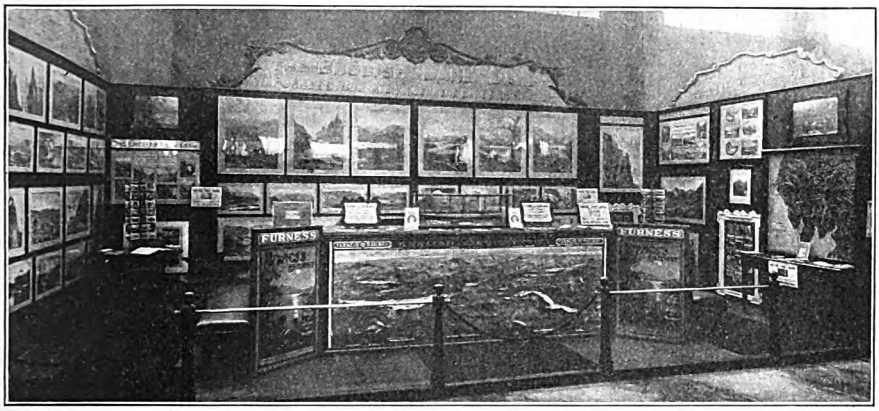
Holidays in the Garden of England and on the Continent.

VISITORS to Kent, Surrey, and Sussex find the inland towns of great interest, both on account of their antiquity and the beautiful country in the vicinity. The seaside resorts are famous for their health-giving properties, and the following places are much frequented during the year:—Folkestone, Hastings and St. Leonards, Bexhill, Dover, Deal and Walmer, Hythe and Sandgate, St. Margaret's Bay, Margate, Ramsgate, Broadstairs, Herne Bay, Birchington and Westgate, Whitstable, Sheerness, etc. Golfers find some of the finest golf courses in the United Kingdom in this area, of which may be mentioned the Royal St. George's, Sandwich; Prince's, Sandwich; Royal



INTERIOR OF "THE STRANGERS' HALL" AS REPRODUCED AT THE GREAT EASTERN RAILWAY STAND AT THE ANGLO AMERICAN EXPOSITION.

Digitized by Google



THE FURNESS RAILWAY EXHIBIT AT THE ANGLO-AMERICAN EXPOSITION.

Cinque Ports, Deal; Hythe, Rye, Littlestone, Bexhill, etc. The best way to see the numerous interesting places associated with Dickens is to make one's headquarters at Rochester. Cheap week-end tickets, available from Friday to Tuesday, are issued by the South Eastern and Chatham Railway from the principal London termini.

After having exhausted the beauties of the "Garden of England" it naturally follows that the visitor will wish to run across to the Continent and pay a visit to Picardy, with its inexpensive hotels, pensions, villas, chalets, splendid sands and bathing, golf and tennis, fishing and boating, cycling and motoring. The South Eastern and Chatham Railway, "The Royal Road to the Continent," controls the Royal Mail and shortest sea route, *viâ* Dover and Calais; the Folkestone and Boulogne route; the Dover-Ostend route; the Queenborough and Flushing route; and the Folkestone-Flushing route. It will thus be seen that the South Eastern and Chatham Railway runs in connection with the chief services between England and France, Germany, Belgium, and Holland, and provides passengers with the means of reaching all the cities and places of interest that lie beyond Great Britain's Highway to the Continent. Free guides and full particulars of cheap continental and other tickets are forwarded free of charge on application to the General Manager, South Eastern and Chatham Railway, London Bridge Station, S.E.

* * *

London and South Western Railway Servants' Orphanage.

SATURDAY July 4th was "Founder's Day" at the London and South Western Railway Servant's Orphanage, Woking, and over a thousand persons were present during the proceedings, which took place in the most delightful of weather. The day was of more than ordinary importance from the fact that the founder of the Orphanage (the Rev. Canon Allen Edwards) was himself present, and took a prominent part in the proceedings. As usual the arrangements were on a comprehensive scale. Perhaps the most interesting function of the proceedings was the opening of the new pavilion and boys' playing field, which has been provided through the energetic work of Mr. Cecil W. Smith on behalf of the Children's Fund. The actual cost is about £1,200, the pavilion costing £126. Of the total, £500 was subscribed to the Children's Fund, but the work has been made possible in no small degree by the generous assistance of the Railway Company in many ways.

The opening ceremony took place at the Pavilion, upon which is inscribed: "The Methuen Pavilion, 1914." Sir Charles Owens presided, being immediately supported by Sir Wm. W. Portal, Bart., the Rev. Canon Allen Edwards, the Rev. E. R. Price Devereux and Mr. Douglas Eve. Sir Wm. Portal hoped the support given so nobly to the Orphanage by the men of the line would be continued. He brought with him a message of goodwill from the directors of the Company, who would continue to interest themselves in the Orphanage. He then declared the pavilion and playing field open.

Later in the afternoon there was an assembly in the vestibule of the Orphanage, when the "Smallbones" memorial was unveiled. It took the form of an inscribed mounted brass plate, the words being:—

"This tablet was subscribed for by the goods guards and brakesmen of the London and South Western Railway in memory of their esteemed colleague George Smallbones, who was fatally injured at Brockenhurst, January 15th, 1914, and who was a pioneer of the Orphanage and a member of the Board of Management from 1885 to 1914."

The Rev. Canon Edwards remarked that it was with sad pleasure he had to unveil the memorial of their affectionate and sincere respect. The brass was surmounted by an enlarged photograph of the late Mr. Smallbones.

Digitized by Google

There was a continuous round of attractions during the afternoon.

A miniature railway attracted not a few. The model train was designed and built by Mr. F. R. Hutchinson, of Surbiton; it was his first attempt at model making, and was produced without working drawings. It is practically an exact copy of one of Mr. R. W. Urie's latest engines, and the following brief description may be interesting. The length of the model over all is 6 ft., rail gauge is 6 in., driving wheels 6¾ in., bogie wheels 3½ in., cylinders: 1½ in. bore, 2 in. stroke.

The valves are actuated by "Walschaerts" gear. Steam pressure is 50 lbs. per sq. in. The tender runs on double bogies, and is fitted with a foot brake. The tank holds 2½ galls. of water. Engine weight in working order is 2 cwts.

This train was an interesting and well-patronised attraction, and the penny rides brought in no less than £2 1s. 6d. during the day.

Considerable interest was also taken in the exhibition of boys' carpentry and woodwork, girls' needlework and artificial flowers, the proceeds from which stalls, together with the confectionery and refreshments, are devoted to the maintenance funds of the Institution. A Red Cross tent was fitted up on the girls' playing green. Teas were provided in the dining and drill halls under the superintendence of the Ladies' Committee. The company gathered together again in the evening for the distribution of prizes. Sir Chas. Owens presided, and was supported by Lady Owens, together with others present at the former formal assemblies. In the course of his speech the Chairman said that despite the increased cost of provisions the domestic expenses of the Orphanage showed a decrease of £80 last year, but whether that was done by starving the children he would leave them to judge by looking at the children themselves. One item went up, and that was for rates, taxes and insurance, which amounted to £244. If relief ought to be given anywhere it ought to be given to such institutions as the Orphanage. Since the Orphanage had been in Woking there had not been a single death. Twenty thousand circulars were being sent out asking the men of the line to join a scheme of giving a contribution of one penny per week to the Orphanage; the amount so raised would bring in sufficient to cover the annual expenditure. Lady Owens then distributed the prizes, and thanks were accorded her for performing the office in the absence of Lady Portal, who was to have done so.

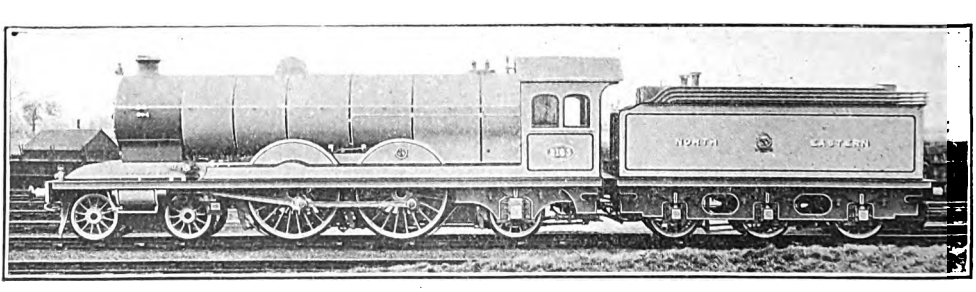
* * *

Curiosities of Double-Heading.

SOME time ago the question was raised as to trains which are or have been hauled by two engines belonging to different companies. A Knutsford reader specifies the 2.45 p.m. train from Manchester (London Road), which consists of London and North Western vehicles for Birmingham in front, and a North Staffordshire portion behind. The train engine is usually a London and North Western locomotive, with a North Staffordshire tank engine as pilot. At Stockport, the train is divided, the front portion leaving at 2.55 and the rear portion at 3.0.

NEW THREE-CYLINDER SUPERHEATER ATLANTIC LOCOMOTIVE: NORTH EASTERN RAILWAY.

Designed by Mr. V. L. RAVEN, Chief Mechanical Engineer.



These engines are virtually replicas of the 733 class of three-cylinder simple (Schmidt superheater) locomotives already in service, and the dimensions are substantially the same. They are fitted, however, with the Lockyer patent regulator valve and Ross muffled safety valves, and include a few other variations in detail.

Digitized by Google

With a view to still further improving the facilities for reaching the popular resort of Southend-on-Sea, the Great Eastern Railway commenced on July 5th to run every Sunday an additional four fast trains from Liverpool Street station to Southend with a corresponding number in the opposite direction. Several of these trains perform the journey in an hour and other trains have been accelerated. London's nearest seaside residential resort is therefore now, not only well provided with the means of quickly reaching town on week-days, but also on Sundays. The coast resorts of Clacton, Frinton and Walton have benefited by additional late trains from London, on week-days since July 1st. The 7.35 p.m. restaurant car train from Liverpool Street connects at Colchester with a new train leaving that station at 8.55 p.m. for Clacton, Frinton and Walton, whilst the 12.3 Saturday night supper car train from Liverpool Street to Clacton also conveys passengers to Frinton and Walton.

* * *

Many Railway Magazine readers will remember a concert was held in the Royal Albert Hall, London, in the early part of the year in aid of the Railway Benevolent Institution, which as a result benefited to the extent of upwards of £650. The members of the huge choir and orchestra, numbering over 900, all drawn from the railway service, desired to record permanently their feelings of indebtedness to Mr. William Johnson Galloway, who acted as conductor throughout the evening, and a very handsome loving cup was subscribed for. This was presented to Mr. Galloway by Mrs. H. W. Thornton at a concert recently given by the Great Eastern Railway Musical Society in the Hamilton Hall of the Great Eastern Hotel, nearly the whole of the railways concerned being represented at the function by their committeemen.

* * *

For the boat trains between Dublin and Kingstown Pier, Dublin and South Eastern Railway, new rolling stock, recently illustrated in the Railway Magazine, has been provided. The trains consist of first and second composite and third-class bogie carriages. The coaches are 58 ft. long over the body and 9 ft. 6 in. wide. The composites contain four first and five second-class compartments, and the third-class ten compartments. The first-class compartments are panelled in Pollard oak with dark walnut mouldings and trimmed with terra-cotta moquette. The second-class compartments are panelled in teak with mahogany mouldings and trimmed with dark red and green repp. The thirds are finished in teak sheeting and trimmed with black and brown repp. The carriages are lighted with gas on the Pintsch system, each compartment having a 50 c.p. inverted mantle and they are heated with the low-pressure system of steam heating. The carriages are built on steel frames, and the bogies are of pressed steel with rolled disc wheels.

* * *

Holiday Season tickets covering various districts in the Wye Valley have been introduced by the Great Western Railway. These tickets are issued to visitors on production of the return half of a tourist or excursion ticket to a resort in the Wye Valley. One of the districts covers the railway between Hereford, Abergavenny, Pontypool Road, Monmouth, Tintern, Chepstow, Symonds Yat and Ross; another embraces Hereford, Ross, Gloucester, Chepstow, Tintern, Monmouth, Usk and Symonds Yat; and the third takes in the Wye Valley proper, from Hereford to Ross, Monmouth, Tintern and Chepstow, with an extension from Monmouth to Usk.

* * *

Excursion facilities are often associated with through booking arrangements over other lines to connect with the railway actually concerned; but triple arrangements are relatively rare, and there are features of novelty in arrangements between the Great Eastern, Metropolitan, and Great Northern Railways in reference to the Great Northern half-day trips to Sutton-on-Sea and Mablethorpe, and Great Eastern half-day trips to Clacton-on-Sea. For a third-class return fare of 3s. 6d. passengers are booked through from nearly all Great Eastern suburban stations as far out as Cheshunt, Loughton, Ilford, Wood Street, Woolwich and Lower Edmonton, to join the 11.30 a.m. train from King's Cross. Passengers can travel by any train to Liverpool Street arriving after 9.30 a.m., and thence by Metropolitan Railway to King's Cross (Metropolitan). These facilities apply every Thursday during July, August and on September 3rd. Similar arrangements are in force from Great Northern stations for the Clacton-on-Sea excursions.

Digitized by Google

In consequence of serious ill-health, Mr. Ffolliott Vere Denning, Assistant Superintendent of the Line, London and North Western Railway, has retired. He joined the railway service in May, 1872. His initial position was that of a junior clerk in the London and North Western and Great Western Joint Railways' Superintendent's Office at Shrewsbury. In 1875, he was transferred to the London and North Western Railway Goods Department at Camden, and after serving two years there, he was removed to the London District Superintendent's Office at Euston in 1877, where he served under General Vaughan and afterwards under the late Mr. E. M. G. Eddy. In November, 1881, he was promoted to be Travelling Assistant (or "Runner") to Mr. G. P. Neele, then Superintendent of the Line, and in January, 1893, was made District Superintendent of the Central Division, with offices at Birmingham. In 1895, upon the retirement of Mr. Neele, he was again transferred to Euston, to occupy the important position of Outdoor Assistant to Mr. (now Sir) Robert Turnbull, who had been appointed to succeed Mr. Neele. Mr. Denning occupied that position until promoted to the new office of Assistant Superintendent of the Line as from October 1st, 1909.

* * *

We regret to record the death of Mr. George James Crosbie-Dawson, Chief Engineer, North Staffordshire Railway. He gained his early experience of railway engineering with the London and North Western Railway, and was Resident District Engineer of that line. He next joined the Lancashire and Yorkshire Railway as Chief Assistant Engineer, and in 1886 accepted the position of Chief Engineer of the North Staffordshire Railway. Mr. F. A. Lowry Barnwell has been appointed successor to Mr. Crosbie-Dawson. He was articled to the late Mr. G. J. Crosbie-Dawson in September, 1895, and was subsequently made resident engineer on the Leek, Caldon Lowe and Waterhouses Railways. Mr. Barnwell then remained in that district as maintenance engineer also taking charge of the Leek and Manifold Valley Light Railway, and controlling the large limestone quarries owned by the Company at Caldon Lowe, where a thousand tons of limestone are sent out daily into the various iron districts of Staffordshire. On the death of Mr. John Bradbury, Mr. Crosbie-Dawson's chief permanent way assistant, Mr. Barnwell, was appointed to fill his place.

* * *

After a railway term of over fifty years, including twenty-one as Goods Manager of the London, Tilbury and Southend Railway, Mr. E. Chalk has retired. A large gathering of the officers and staff assembled in the Board-room at Fenchurch Street terminus, to bid him farewell, and in token of the respect with which he is held by every member of the staff, he was presented with a handsome silver salver, suitably engraved with the inscription: "Presented to Edwin Chalk, Esq., by the staff after a life-long service, the last twenty-one years as Goods Manager." It was surmounted by the London, Tilbury and Southend Railway coat-of-arms, with the years 1862—1913. Mr. A. G. Swann, the chief goods clerk, in a very happy and appropriate speech, formally handed the salver to Mr. Chalk, after which Mr. D. E. Munns, superintendent at the Commercial Road Goods Depôt, and Mr. F. W. Holbrook, of the train working department, both added their tributes to the excellent relationship which had always existed between the Goods Manager and the other departments.

* * *

Following his retirement, at the end of May, Mr. William Montgomery Urie, M.I. Mech.E., Works Manager, Caledonian Railway locomotive works, St. Rollox, Glasgow, was presented with a purse of sovereigns and an umbrella from the foreman and workers attached to the locomotive shops, as a token of the high esteem in which he was held by them. Mr. Urie was born in Glasgow, and served his apprenticeship at one of the Glasgow locomotive works. He was then employed by various firms in Glasgow, Leith, Jarrow-on-Tyne, and Manchester and afterwards held responsible positions in the Compagnie Belge Engineering Works, Brussels; Gouin and Co.'s Locomotive Works, Paris; Singapore Steam Tramway Company, Singapore; Dübs and Co., Glasgow; and North British Railway Company, Glasgow.

MR. W. M. URIE.

Late Works Manager, Caledonian Railway, St. Rollox.

Digitized by Google

In the year 1889 he joined the service of the Caledonian Railway Company as leading draughtsman, and was promoted to the position of works manager in November, 1897, which he held till the day of his retirement 28th May, 1914. In the latter position he had full charge of the entire works, employing twenty-six foremen and a staff of 3,000 men, building locomotives, carriages and wagons, also repairing same. He was President of the works ambulance corps for many years, also Director of the Dunoon Seaside Homes.

* * *

As a further attempt to avoid overcrowding difficulties and to add to the convenience of regular long-distance passengers on the Metropolitan District Railway, Mr. W. E. Blake has arranged for an additional car, in charge of a special attendant, to be attached to the 8.50 a.m. train from Ealing, and reserved solely for Mansion House passengers joining the train at Ealing Broadway, Acton Town, Turnham Green, and Hammersmith. A composite first and third class carriage is used. By limiting it to through passengers, and taking up only at certain stations, the difficulty that the train is too long for many of the platforms is overcome. Similar methods will probably be adopted in other cases.

* * *

It is hoped that electric traction will be commenced on the Kingston loop routes from Waterloo before the end of the year. The following times are quoted as representing the duration of journey by stopping trains under the new conditions, from Waterloo to various suburban stations :—

	Min.		Min.
Earlsfield ..	12½	Barnes	17½
Wimbledon ..	16	Mortlake ..	20½
Raynes Park ..	19½	Richmond ..	24½
Malden	22	Twickenham ..	29
Norbiton ..	25½	Shepperton ..	45
Kingston ..	27½	Fulwell	34
Putney	14½		

* * *

Mr. F. W. Tyler has been appointed Irish Traffic Manager of the Great Western Railway Company, in the place of Mr. E. J. O'B. Croker, retired. At a meeting of managers at the Irish Clearing House, the Chairman (Mr. E. A. Neale, Great Southern and Western Railway), before commencing the formal business of the meeting referred to the retirement of Mr. E. J. O'B. Croker, who had so long been a member of the Conference, first as representative of the Cork, Bandon and South Coast Railway, and latterly of the Great Western Railway. He expressed, on behalf of the Conference, their best wishes for his long life and happiness.

* * *

Mr. J. Tyler, chief assistant to the late Mr. W. J. Jacomb-Hood, has been appointed to succeed Mr. A. W. Szlumper, now Chief Engineer London and South Western Railway, as London District Engineer. Mr. John Tyler is the son of the late Mr. John Tyler, Superintendent of the Line, London and South Western Railway, and a member of the Institute of Civil Engineers. He entered the service of the London and South Western Railway Company under the late Mr. William Jacomb, M. Inst. C.E., Chief Engineer, in 1884. From 1885 to 1891 he was assistant to the resident engineer on the main line widening and other works. From 1891 to 1899, he was general engineering assistant under the late Mr. Edmund Andrews. From 1899 to 1904, Mr. Tyler acted as resident engineer in charge of the construction of the Amesbury and Military Camp Light Railway, the reconstruction and enlargement of Salisbury station, widenings of the main line between Grateley and Newton Tony Junction, and a portion of the main line between Micheldever and Winchester. In 1904 he was appointed Resident District Engineer for the Somerset and Dorset Railway, and in January, 1908, he returned to Waterloo (under the late Mr. J. W. Jacomb-Hood).

* * *

Mr E. F. Fleet has been appointed signalling engineer of the North Eastern Railway in succession to Mr. Arthur Hurst. Commencing as a pupil with Messrs. McKenzie & Holland, Ltd., Mr. Fleet entered the service of Mr. S. T. Dutton in 1889, In 1883, Mr. Fleet joined the Railway Signal Company, Ltd. In 1899 he was appointed outside superintendent engineer for Mr. J. P. O'Donnell, and in 1900 he joined the North Eastern Railway as chief draughtsman in the signalling department at York. Later he was appointed assistant signalling engineer, and in May, 1910, he took over the supervision of the whole of the signalling work in the Northern Division under Mr. Charles A. Harrison.

* * *

The *Princess Margaret*, launched at Glasgow recently, and christened by Mrs. Rene Redmond, the youngest daughter of Sir Thomas Shaughnessy, President of the Canadian Pacific Railway, is the first of two passenger steamers which are being built by Messrs. Denny Brothers for the Canadian Pacific Railway. They will be used in the British Columbia coast service between Vancouver, Victoria and Seattle. The principal dimensions are: Length 395 ft., breadth, moulded, 54 ft., depth to promenade deck, 28 ft. 3 in. The vessel will be fitted out with wireless telegraphy on the Marconi system, and a special petrol-driven generating set is installed on the boat deck, which is capable of working the wireless system as well as lighting the decks, even if there be no steam in the boilers. The vessel will be propelled by means of geared turbines supplied with steam by oil-fired water-tube boilers, the installation being by Messrs. Denny & Co. On June 22nd another vessel for the Transatlantic services of the Canadian Pacific Railway Company, the *Missanabie*, was launched from the yard of Messrs. Barclay, Curle & Co., Ltd., of Whiteinch. This is a twin-screw vessel 520 ft. long, 64 ft. broad, 41 ft. deep, 13,000 tons gross tonnage, 18,000 tons displacement, and with accommodation for 520 cabin passengers, 1,200 third-class passengers, 300 crew, and a cargo capacity of 400,000 cubic ft.

Digitized by Google

AN INVITATION FROM THE MIDLAND GREAT WESTERN RAILWAY OF IRELAND.

INTENDING tourists in Ireland will do well to secure some of the excellent holiday literature published by the Midland Great Western Railway. Application should be made to the Traffic Manager, Broadstone station, Dublin, for penny booklets respecting Galway and District, Connemara, Achill and Westport and District, or Sligo and District. For sixpence a splendidly illustrated guide of some 174 pages may be obtained dealing exhaustively with Connemara, Achill and West of Ireland. The books are highly creditable productions, and the charge, of course, is merely nominal.

* * *

SIR CLARENDON GOLDING HYDE has been elected Deputy-Chairman of the Metropolitan Railway Company, in place of the late Mr. Paul Speak. Sir Clarendon Hyde joined the Board of the Metropolitan Railway on 12th December, 1912, to fill the vacancy caused by the death of Lord Furness. He is a partner with Lord Cowdray in the firm of S. Pearson and Son, Ltd., and was a Director of the Great Northern and City Railway.

SOON after their introduction on the Great Western Railway one of the large French compounds was for a time fitted with a standard Great Western boiler, though afterwards this was removed and the original boiler replaced. As a result of recent shopping, No. 103 *President* has been fitted with a standard conical Belpaire boiler, Swindon superheater, and the now usual top-feed arrangement, while the first of the French engines, No. 102 *La France* has a Swindon superheater fitted to the original boiler.

* * *

DUBLIN is a highly favoured city in having almost at its gates, as it were, a succession of changing scenery in which mountain, sea, wood and river are blended together in delicious landscapes. For the benefit of Irish residents as well as for tourists from the busy centres of British population and industrial activity who in the holiday season daily cross the Irish Sea in well-fitted steamships, the Dublin and South Eastern Railway publishes an excellent 3d. handbook entitled "Through the Garden of Ireland." In addition to scenic views and descriptive letterpress, this publication prpvides pictures of railway trains and stations, and includes a useful hotel and restaurant list.

* * *

IN the Bristol suburban district, including the Clifton Down services, the Great Western Railway Company are employing "set" trains of four bogie coaches, worked on the now familiar principle by 0-6-0 saddle-tank shunting engines placed centrally. The engines have been painted red like many of the 0-4-2 side tank engines employed on a similar service. Some of the engines thus employed belong to the comparatively small class of domeless saddle-tank locomotives, numbered in the 2,100 series.

* * *

A NEW athletic ground and pavilion at Doncaster was opened recently by the Hon. F. S. Jackson, son of Lord Allerton, Chairman, Great Northern Railway. The ground is intended primarily for the use of employés at the Doncaster Plant Works, and is situated at Hexthorpe. There are two cricket pitches, three lawn tennis courts, and a full-size bowling green. A handsome pavilion, built of timber, adorns the ground.

* * *

A REMARKABLE exhibit of all steel details for railway carriage construction was recently exhibited by Messrs. G. D. Peters & Co., Ltd., at their show-rooms in Moorfields, London, E.C. They are largely based upon the work of an American firm which specialises in this field, and such details are largely used for steel car construction in the United States. Various types of moulding, window and door frames and details of construction are available, of designs permitting of decoration so as to provide almost exact replicas of both standard and more ornate cabinet work in wood as at present adopted, and

Digitized by Google

it is difficult to distinguish one from the other. In fact, virtually anything which can be done in wood can be reproduced by these rolled steel sections, and by building up on an angle iron or other type of frame exceptionally satisfactory results can be realised, while cleanliness, absence of dirt collecting corners and freedom from fire risk are realised in a way which satisfies all criticisms against present ordinary methods of carriage construction. Many of these built up structures are of great interest, and as the exhibit was visited by representatives of many of the leading home and foreign railways, we anticipate that the result will be the incorporation of many of these specialities into general practice. Messrs. Peters also show many of their standard designs of window fittings, blinds, ventilators, seats and other carriage details for which they are so well known.

* * *

THE summer meeting of the Institution of Mechanical Engineers was this year held in Paris and Northern France, commencing on Monday, July 6th. The following papers of railway interest were read:—(1) "Recent Developments of Express Locomotives in France," by Professor Edouard Sauvage; (2) "Compound Articulated Locomotives," by Mons. Anatole Mallet; (3) "Signalling on Trains in Motion upon French Railways," by Messrs. E. Solacroup (Orleans Railway), A. Sartiaux (Northern Railway), F. Lancrenon (Eastern Railway), A. Herdner (Southern Railway), A. Claveille (State Railways) and L. Maréchal (Paris Lyons and Mediterranean Railway). Various visits, excursions, and other functions are also included in the programme.

* * *

THE escalators now in course of erection at Baker Street station, to connect the Metropolitan and Bakerloo lines, are expected to be completed in about two months. Other moving stairways are contemplated at Oxford Circus (to connect with the Central London Railway), Shepherd's Bush, the Bank, and Piccadilly Circus.

* * *

To meet increased demands, the Great Western Railway works at Swindon are to be considerably extended. "A" shop is to be doubled, though it is already one of the largest under a single roof. The power station equipment is to be increased. The old "C" shed, built in 1874, is being replaced by a very much larger shop equipped with electric cranes and traversers. This rebuilding does away with the last of the old broad-gauge sheds left in Swindon.

* * *

AT the annual meeting of the Railway Benevolent Institution, held at the Cannon Street Hotel, Mr. W. Johnson Galloway, director, Great Eastern Railway, was elected a Vice-President for life in recognition of his services in connection with the recent concert at the Albert Hall, at which Their Majesties The King and Queen were present.

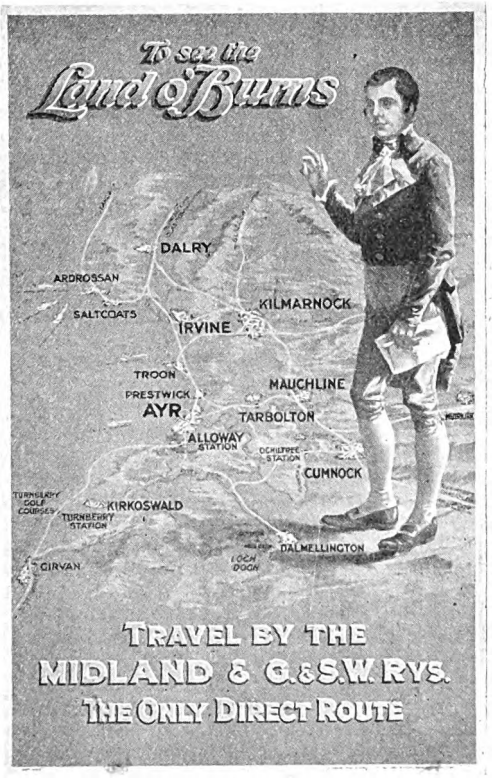
THE Great Eastern Railway announce that the rates for season tickets for one and two months between London and provincial stations including the east coast resorts, also the rates for similar periods between provincial stations have, with a few exceptions, been reduced on and after July 1st, 1914. Full particulars are obtainable from the Secretary, Liverpool Street station, London, E.C.

* * *

WE regret to record the death of Mr. Andrew Spence, secretary and manager of the Londonderry and Lough Swilly Railway Company, a gentleman who had the almost unique record of spending the whole of his business life on one railway and rising from a junior clerk to the supreme official position.

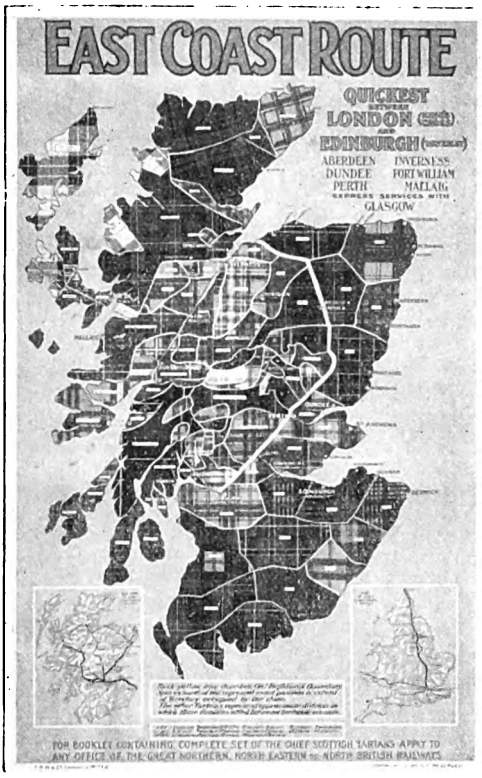
* * *

THREE excellent posters have been issued by the Glasgow and South Western Railway. One is a fine scenic map of the Firth of Clyde, showing the steamer routes whereby the Glasgow and South Western Railway provides the "Direct Route to the Clyde Watering Places." The second bears a large portrait of Robert Burns, and is inscribed "Ayrshire Sea-board and Land o' Burns: Glasgow–Ayr in 50 minutes." The third, an exceptionally effective one, is reproduced on this page.



AN ARTISTIC "BURNS" POSTER.

Digitized by Google



A "TARTAN" MAP OF SCOTLAND AS PRESENTED BY A NEW POSTER ISSUED BY THE EAST COAST RAILWAYS.

The original is coloured, and is exceptionally effective.

SEVERAL important staff changes are announced on the Cardiff Railway. Mr. H. S. C. Ree, Chief Engineer, has retired, after holding that position for 17 years, and is succeeded by Mr. Alaric Hope, chief assistant engineer to the Mersey Dock and Harbour Board. Mr. B. T. Holtham, Stores Superintendant, has also retired on pension, after 42 years railway service, and is succeeded by Mr. Cyril Tredcroft.

* * *

FORMERLY sold at one penny, the Lancashire and Yorkshire Railway Time Tables book is now priced twopence. In addition to giving train times the book includes some very useful maps and plans. The latter to business men ordering traffic to or from Manchester, Liverpool, Fleetwood, Goole, etc., are of particular value.

* * *

A PARTY of French and Belgian editors visiting England were recently entertained to luncheon at the Furness Abbey Hotel on their arrival in the Windermere district. At Lakesville they were met by Mr. Alfred Aslett, Secretary and General Manager of the Furness Railway, who accorded them a hearty welcome.

COMMENCING August 1st no fewer than 1,700 employés of the London and North Western Railway Company will receive increases of pay, varying from £10 to £30 per annum, in consequence of a regrading of the staff which has been decided upon by the Directors. In addition, the maximum salary for the lowest-paid class of clerks will be £100, instead of £90 as at present.

* * *

IN consequence of changes in organisation on the North British Railway, the District Traffic Superintendent at Coatbridge no longer deals with the commercial work pertaining to merchandise traffic in the Monkland District, this being now included in the duties of the Chief Goods Manager's department.

* * *

NEW rolling stock to meet the demands of the summer train services on the North Staffordshire Railway include a new bogie train consisting of two third-class brake vans, with four passenger compartments in each, two corridor lavatory seven-compartment thirds, and one first-class six-compartment corridor lavatory carriage. Each vehicle is 52 ft. 6 in. long.

* * *

"AMERICAN Signal Practice as compared with British Practice" was the subject of a paper read recently before the members of the Institution of Railway Signal Engineers by Mr. A. H. Rudd. After discussing the development of signalling in England and in America, the author described the special system of informative signalling now being adopted by the Pennsylvania Railroad.

* * *

Additional Great Western four-cylinder express engines (4–6–0 type) are No. 4,053 *Princess Alexandra*, No. 4,054 *Princess Charlotte*, No. 4,055 *Princess Sophia*, No. 4,057 *Princess Elizabeth*, No. 4,058 *Princess Augusta*, and No. 4,060 *Princess Eugenie*. The 2–6–0 mixed traffic locomotives with 5 ft. 8 in. driving wheels and outside cylinders are doing extremely good work, particularly in the smart running of goods trains. There are already some 60 of the type in service, and it is stated that the number is to be increased to 80.

* * *

"Trip week," the occasion of the annual exodus from Swindon, when the works are closed for some ten days, and the Wiltshire town appears half deserted, commenced this year on July 9th. The works re-opened at 9 a.m. on July 19th. This year's trip is stated to be the biggest on record, the number of excursionists being close on 26,000. The vicinity of the G.W.R. Station in the early hours of the morning presented the appearance of a fair and vendors of confectionery, flowers and newspapers did a roaring trade. Not many short of 12,000 chose either Weston-super-Mare or resorts further west for their holiday, over 5,000 went to Weymouth, nearly 4,000 to London, 2,800 to South Wales, and 1,800 to the North of England. Adults totalled over

Digitized by Google

15,000 and children over 10,000, the gross total showing an increase of nearly 800 on last year's figures and making the trip a record in point of numbers. How this annual excursion has developed will be understood when it is remarked that the first trip 66 years ago, was a brake outing to Marlborough in which about a dozen participated. This outing became an annual event, but the conditions of travelling 40 or 50 years ago were vastly different to what they are now. The old third class carriages in which passengers were packed like sardines compare most unfavourably with the present day corridor carriages, and nowadays Swindon trippers travel in absolute luxury.

* * *

The old weigh-house for barges on the Somerset Coal Canal at Midford, referred to by Mr. Alfred Arthurton in his account of the Camerton and Limpley Stoke Railway, which appeared in the RAILWAY MAGAZINE for July, 1911, has now been demolished. The six pillars of the building which supported the roof, have been acquired by a Bath antique dealer, who has advertised them as suitable for the construction of summer houses. These pillars are eight feet high and about three feet in diameter, and each is constructed from a single piece of Bath stone.

* * *

As from July 1st, practically all the goods vehicles of the Somerset and Dorset Joint Railway were transferred to the stock of the two owning companies, the Midland Railway Company and the London and South Western Railway. Only a few vehicles of special pattern to suit certain local traffic requirements, the rolling stock needed for the private business of the railway, and the brake vans have been retained as Somerset and Dorset property. The other vehicles bear temporary plates notifying their transfer to the Midland or South Western Company.

* * *

MR. C. W. BARTHOLOMEW'S model railway at Blakesley Hall, near Towcester, was visited on Saturday, June 20th, by a large party of members of the Railway Club, with several visitors. Special arrangements were made by the London and North Western and Stratford-upon-Avon and Midland Junction Railways for the journey from London, and on arrival at Blakesley station the party travelled to the Hall on Mr. Bartholomew's 15-in. railway, drawn by the beautiful 4–4–4 petrol tank locomotive *Blacolvesley*. During the afternoon a comprehensive model scenic railway electrically operated, under construction, was inspected, as also Mr. Bartholomew's collection of objects of railway interest. The party were entertained to tea, and in conclusion, Mr. W. Parker, President of the Railway Club, expressed the thanks of members and visitors for the pleasurable time which had been spent and for Mr. Bartholomew's hospitality and interest. On July 18th a visit was paid to the Slades Green sheds of the South Eastern and Chatham Railway. A visit to the Corringham Railway is arranged for August 15th.

* * *

CANADA'S Grand Trunk and Grand Trunk Pacific Railways provide direct, easy and inexpensive communication to all the sporting and pleasure haunts of the Dominion between the Atlantic and the Pacific. From the offices of the European agent at 17, Cockspur Street, London, S.W., may be obtained free a new publication providing particulars of special summer tours for the 1914 season. Illustrations of rolling stock embrace interior views of cars both for day and night use and a fine photograph is reproduced showing the flight of the "International Limited" *en route* Montreal to Chicago, which forms the longest continuous double track line under one management in the world.

* * *

To facilitate the handling of exhibits at the Panama-Pacific International Exposition a private system of railways has been constructed, covering every part of the 635 acres of the site. Upon the arrival of a train loaded with exhibits it will be "sided" on to this system and the freight cars hauled directly into the exhibit palace for which the display is intended. Rails have been laid inside the buildings so that it will be possible to have the car unloaded on the very spot which the exhibits will occupy. Those exhibits arriving by ship will be transferred to trains and handled in the same manner.

* * *

AT the Panama Exposition, to be held next year at San Francisco, the Grand Trunk and Grand Trunk Pacific Railways' exhibit, covering about 10,000 sq. ft., will show the wonderful resources of the country through which the Grand Trunk and Grand Trunk Pacific Railways pass, while prominence will also be given to the attractions Canada offers to tourists in the Algonquin National Park of Ontario, Muskoko Lakes and the new alpine wonderland opened up in British Columbia by the Grand Trunk Pacific.

* * *

ON the eve of his retirement from the office of Master of the Turners' Company, Mr. F. Fighiera, secretary of the Central Argentine Railway Company, was presented at a recent dinner of the company, attended by the Lord Mayor and Sheriffs, Sir Robert Baden-Powell, and others, with an illuminated address and a massive silver salver in recognition of his services. A diamond bracelet was at the same time presented to Mrs. Fighiera.

* * *

THE Grand Trunk Railway of Canada has just had delivered from the Eastern Car Co., New Glasgow, 400 new box cars for use in moving freight on its lines. Dining and parlour car equipment is also being increased to meet the demands of traffic during the present season. Three new dining cars and one parlour buffet car are shortly due for delivery from the Canadian Car and Foundry Co.

Digitized by Google

Railway Literature.

SOME EUROPEAN RAILWAY PRACTICES. By H. W. Jacobs. [Hill Publishing Co., Ltd. Price 5s. 6d. net.] The author is well-known in American railway circles. The introductory contribution is written by Mr. Wright, Managing Editor of the New York *Railway Age Gazette*, through the pages of which the best part of the present publication appeared in serial form, as a series of articles setting forth the main features of "foreign" (to U.S.A.) practice in order to assist American railway officers in appraising the extent to which European and other conditions could be of assistance to them. Mr. Jacobs is somewhat unfortunate in his choice of an illustration showing an extremely heterogeneous collection of London, Brighton and South Coast Railway vehicles hauled by one of the "Gladstone" engines as typical of the size and character of European locomotives and coaches; but the book itself is more up-to-date, though the scope is so wide that the volume as a whole must be described rather as a series of impressions than as a work of reference. However, within its limits the author presents a good deal of sound comment and research.

* * *

RAILWAY ACCOUNTS AND FINANCE. [By Allen E. Newhook.] Sir Isaac Pitman & Sons, Ltd., 5s. net. This is a new handbook to railway accounts and finance and should be of value to railway shareholders and officials alike at the present juncture when British railways are for the first time publishing annual accounts for the first time in the revised form prescribed by the Railway (Accounts and Returns) Act, 1911.

* * *

KATE'S SACRIFICE. A Railway Story by Louis Weighton, published by the author at 62, Fentiman Road, London. Price 1d. This is a poem intended for recitation. Declaimed by a reciter possessing real histrionic ability it would make a good item for a railway workman's concert.

* * *

A MAP of London, which is issued by Messrs. L. Farmer and Sons, 46, Gresham Street, London, E.C., free of charge, shows the free collection and delivery area and the London County Council area, the Metropolitan Boroughs and the rates in each. It is the only map of its kind in existence and should be much appreciated. Readers desiring a copy should mention the RAILWAY MAGAZINE.

THE Great Western Railway Mechanics' Institution, Swindon Engineering Society, have published a new volume of transactions containing papers read during the 1912–13 session. Papers included relate to: Internal Combustion Engines for using Crude Oils; The Society's visit to the Birmingham District, 1912; The Construction and Inspection of 10-ton Open Goods Wagons; High Speed on Railways. Prices can be obtained from the Hon. Sec. of the Society, Mr. G. W. Ferguson, 2 Emlyn Square, Swindon, Wilts.

* * *

"GEORGE ROMNEY, 1734-1802" is the title of an interesting booklet published by T. A. J. Waddington, Mansfield Street, York, by arrangement with the Furness Railway. Appropriate illustrations are appended to the letterpress, and a portrait of Mr. Alfred Aslett, General Manager, Furness Railway, is also given, with the acknowledgement that largely through his foresight and enterprise the early home of George Romney has been saved to the nation. It will be remembered that the house has been restored and a museum built on the site of the old workshop, while several rail and coach tours and other facilities arranged by the Furness Railway include a visit to George Romney's home, and a tea pavilion provided within the grounds.

* * *

OUR blue-water contemporary, *Syren and Shipping*, has again published its annual Empire number, price one shilling. The special articles include "The Cunarder *Acquitania*," illustrated with a fine selection of photographs; "The Empire's Greatest Highway," describes the various enterprises of the Canadian Pacific Railway. The volume forms a highly creditable production of special value to those concerned in the shipping industry.

* * *

WE have received from the Railway and General Geographical Agency, 24, Surrey Road, Cliftonville, Margate, a copy of "Historical Thanet," the new Official Guide to the Isle of Thanet Light Railway and the allied Motor-'Bus Services. It is of particular interest in so far as every portion of the company's line is clearly shewn by specially drawn maps based on the Ordinance Survey, by permission of H.M. Stationery Office. Sheet maps of Margate, Ramsgate and Westgate are included, and the letterpress is worthy of perusal. The booklet is published at 2d., and copies can be had from the address mentioned.

Digitized by Google

Digitized by Google

GREAT NORTHERN RAILWAY:
DOWN LEEDS AND BRADFORD LUNCHEON CAR EXPRESS.

THE RAILWAY MAGAZINE."

Digitized by Google

Photo] [*L.N.W.R.*

LIME STREET STATION HOTEL, LIVERPOOL.

The London and North Western Railway and Liverpool.

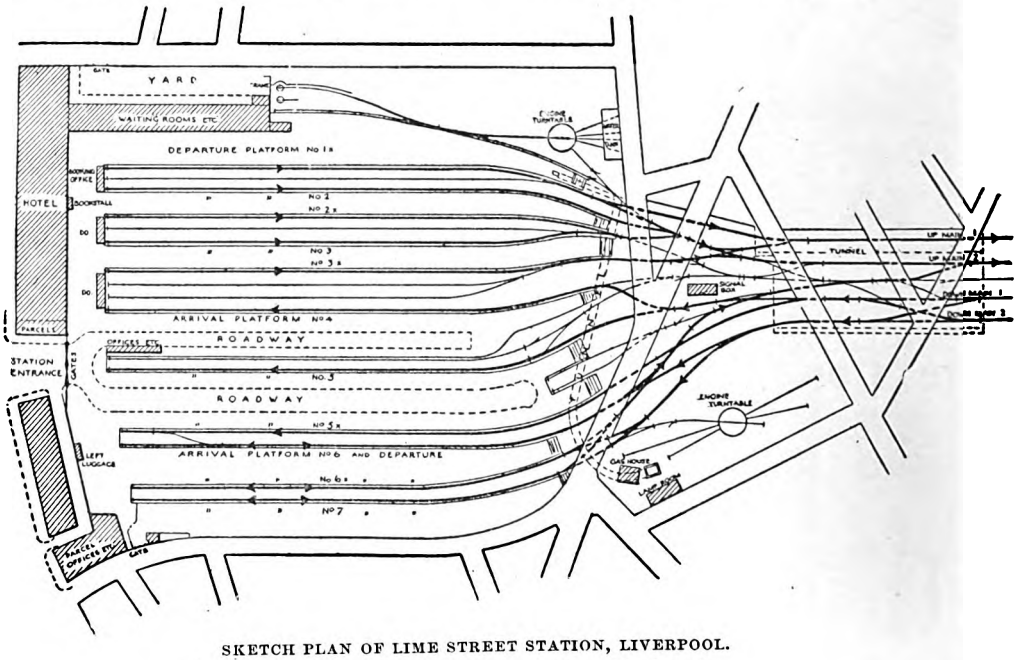
By BASIL MERCER.

ALTHOUGH Liverpool is not a city of mushroom growth, it cannot be said to be a place of great antiquity, and it figures hardly at all in history prior to the year 1600. It was only an insignificant townlet in the days of the civil war, when it was besieged and taken by Prince Rupert, and until the reign of William III. it was merely a chapelry attached to Walton. But after this it advanced rapidly. About the middle of the eighteenth century it was the headquarters of the slave trade, and when this somewhat dubious form of industry declined it became the principal port for tobacco and cotton. Perhaps it was the inaccessibility of the site that delayed the development of the town, for in the days of the Stuarts the south-western part of Lancashire was a *terra incognita*. All around Liverpool were dense forests, and these in their turn were surrounded by the formidable belt of marsh land which caused such anxiety to George Stephenson when the Liverpool and Manchester Railway was being made. Another reason may have been the absence of natural harbours in this district. In fact, Hoylake, in the Wirral Peninsula, now a popular residential suburb, was the usual port of embarkation for Ireland in this part of England. However, with the advent of railways and steamships, Liverpool advanced by leaps and bounds: in 1700 the population was only about 4,000, but in 1841 it had grown to nearly a quarter of a million, while at the present day it is well over the million.

To everyone interested in the history of railways in England the name of the Liverpool and Manchester is as familiar as the appearance of a taxicab in London or a jaunting car in Dublin, but as a matter of fact it is one of those lines which many have heard about and few know anything of.

Digitized by Google

Books and pamphlets on the London and Birmingham, Grand Junction, and Leicester and Swannington lines are to be met with fairly often; but authentic accounts of the earlier undertaking are comparatively rare, so a brief recapitulation of its history will not be superfluous. The first proposal for a railway between the two Lancashire cities came from the celebrated engineer James (called by some "the father of English railways") in 1822. Two years later, in 1824, a Mr. Sanders published a pamphlet warmly advocating Mr. James' idea and guaranteeing the cost of a survey. Later on in the same year a meeting was held at



SKETCH PLAN OF LIME STREET STATION, LIVERPOOL.
(Reproduced from *Modern Railway Working.*)

of subscribers was held, when twelve directors were chosen. George Stephenson was appointed engineer, and two important works, Wapping Tunnel and the drainage of Chat Moss, were commenced. 1828 saw the above mentioned tunnel completed and the Sankey Viaduct begun, while in 1829 the celebrated skew bridge at Rainhill was finished. In this year also the ever-famous locomotive trials took place, and Stephenson's engine, the *Rocket*, obtained the prize. It must not be supposed, however, that these trials were held to find out which was the best engine: a far greater point was under consideration, namely, to decide what mode of traction should be employed on the line then rapidly approaching completion.

Liverpool, with the then mayor, Mr. Charles Lawrence, in the chair: at this meeting it was determined to form a company for making a railway from Liverpool to Manchester, and the first prospectus was issued on October 29th. It is curious to note that at this time the conveyance of goods was considered to be the only object of importance, the passenger receiving but slight consideration.

In 1825 a bill was introduced into Parliament to obtain sanction for the making of the line, but this measure was thrown out, largely owing to the opposition of the local canal companies. In 1826 the bill passed both houses, and the first general meeting

At this time the locomotive was held in low estimation, most of the proprietors favouring stationary engines and rope haulage, while a few advocated horse haulage; indeed, one of the competitors at the Rainhill trials was a locomotive propelled by a horse walking over a kind of treadmill.

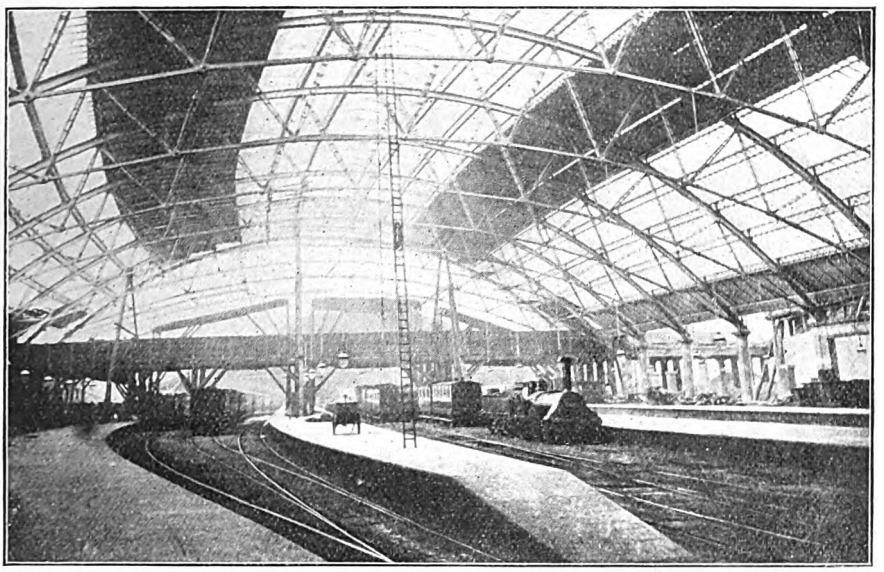
In the early part of 1830, the *Rocket* drew a train across Chat Moss, and the public opening of the Liverpool and Manchester Railway took place on September 15th of that year.

Digitized by Google

While not belittling the enterprise of the commercial community of Manchester, it will be apparent from the foregoing that Liverpool may take the main credit for the promotion of the first big railway undertaking in the country. It can also be claimed that the chief engineering achievements were, and are still, at the Liverpool end of the line. Chat Moss is an important exception to the previous statement, but that famous work is some way from either city. The carrying of the line over this dreary depth of ooze is, perhaps, George Stephenson's greatest achievement, for he alone held faith in the plan he adopted and ultimately triumphed with, in spite of the discouraging remarks about the scheme from everyone connected with the making of the line.

No more need be said about Chat Moss here, as it has been very thoroughly described by almost every writer on railways, so much so that the Wapping Tunnel is sometimes passed over without remark or completely forgotten. To some it is but a name, to others it is not even that: it appears in lists of longest tunnels as having a length of 2,100 yards, but owing, perhaps, to its not being used for passenger traffic it generally escapes observation. And yet it was no mean achievement for the promoters and engineers of the first railway to project, make and work a tunnel of this length in those early days. The upper entrance is situated midway between Crown Street and Edge Hill, in what is now called Wapping Cutting. From that point it descends at a grade of 1 in 48 to Wapping Goods station, adjacent to the docks; and as a natural consequence rope haulage was the means of traction employed and not the *Northumbrians*, *Comets* or *Arrows* of that period. Joseph Locke, who afterwards attained fame on his own account, was associated with Stephenson in the making of this work, and the manner in which it was carried out "reflects great credit on both parties" as the writers of that day justly remark.

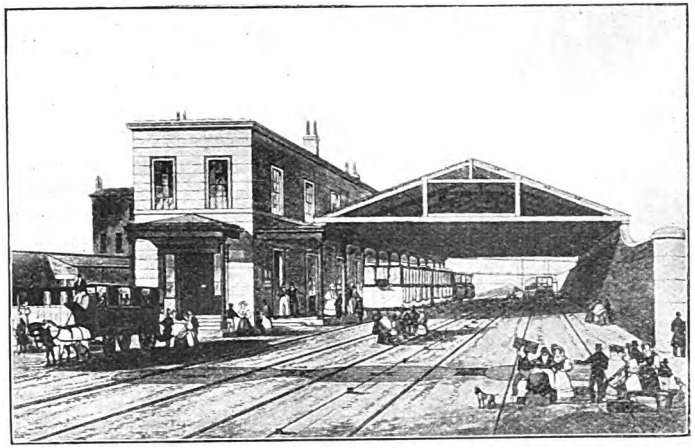
Mention of Crown Street brings forward a host of important details, and it will be simplest to take them in chronological order. The Liverpool and Manchester Railway entered Liverpool *viâ* what is now the Wapping goods branch, passing to the south of the present Edge Hill station, and leaving the passenger route of to-day a short distance east of that point. It then enters a wide excavation, somewhat erroneously termed Wapping Cutting, where the passenger traffic of the railway was dealt with from September in 1830 until December of that year. Here the railway was spanned by the famous Moorish Arch, from which flights of steps led down to the line enabling passengers to join the trains.



Photo] [*L.N.W.R.*

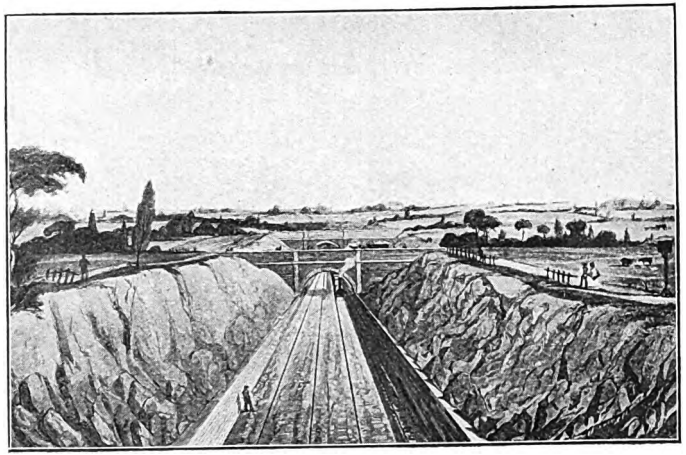
LIME STREET STATION IN THE 'SIXTIES.

Digitized by Google



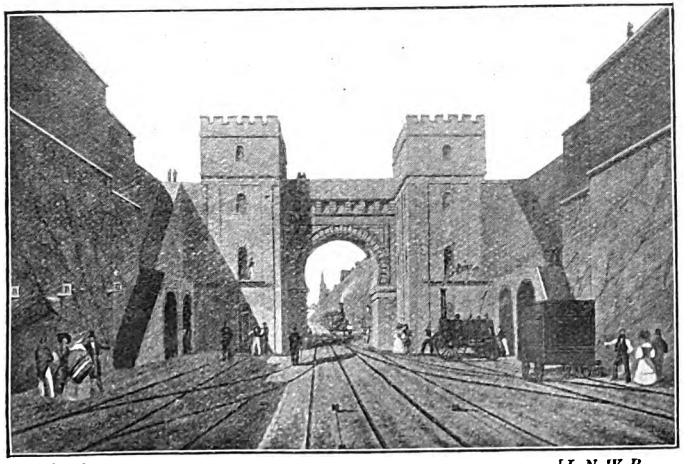
Photo] [*L.N.W.R.*

CROWN STREET STATION, LIVERPOOL.



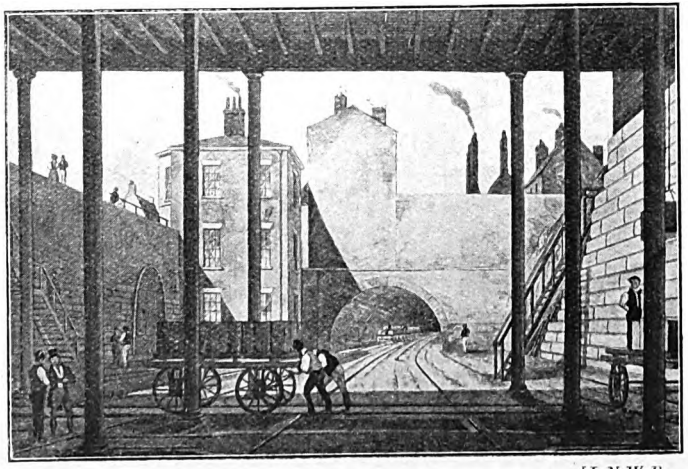
Photo] [*L.N.W.R.*

A VIEW ON THE LIVERPOOL AND MANCHESTER RAILWAY.



Photo] [*L.N.W.R.*

MOORISH ARCH, LOOKING FROM THE TUNNEL.



Photo] [*L.N.W.R.*

WAREHOUSES AT THE LOWER END OF THE WAPPING TUNNEL.

Digitized by Google

One of these stairways, on the north side of the line, is still in existence, though scarcely usable, but the one on the south side disappeared when the line leading to Crown Street Goods station was widened.

From the Moorish Arch four tracks led to the tunnel mouths, of which there were three, the centre one being Wapping Tunnel proper and carrying a double track down to the docks, while the one on the north side was (and is) a single line tunnel leading into Crown Street yard and to the original Liverpool station of the company; the tunnel on the south side was also single and led to the south side of the goods yard. This last tunnel was not completed for some time after the opening of the line. It penetrated for a short distance into the red sandstone, and was used as a carriage repairing shop, the entrance being closed by wooden doors. Later on it was carried right through and in due course doubled. It now forms the main access to Crown Street. Engravings of the 1830 period generally show this tunnel as in active use, but this, of course, is incorrect.

The Liverpool and Manchester Railway was opened by the Duke of Wellington on September 15th, 1830; and once again the old engravings give a rather inaccurate idea as to what actually happened. In one of these pictures an engine and train are shown emerging from the north tunnel into the open space underneath the Moorish Arch, which is not correct. We may read in the *Liverpool Chronicle* of September 18th, 1830, that the Duke and party got into the train at Crown Street, and this train was then hauled through the tunnel by rope, the engine being attached at the other end of the excavation, when the train departed towards Manchester "with the speed of an arrow," as the chroniclers of that time say. Curiously enough the company possessed an engine named *Arrow*, which deadly missile was capable of occasionally attaining a good thirty miles an hour! Another notable fact is that, while the train at the opening of the line started from the station in Crown Street, the station of that name was not generally used by passengers until the following December, the aforesaid Moorish Arch being the point of embarkation for the first three months. This statement is borne out by another newspaper account of the ceremony, and both accounts give a description of the Duke's carriage, which vehicle was surmounted by a canopy that had to be lowered to allow of its proceeding through the tunnel.

Crown Street north tunnel, the one just mentioned, was 290 yards in length and 12 ft. in height Although an endless rope was used in Wapping Tunnel, at first a single rope only was provided in the shorter tunnel, the end of the rope being brought back on a trolley drawn by a horse. Horse traction is still employed for the light traffic that now traverses this route.

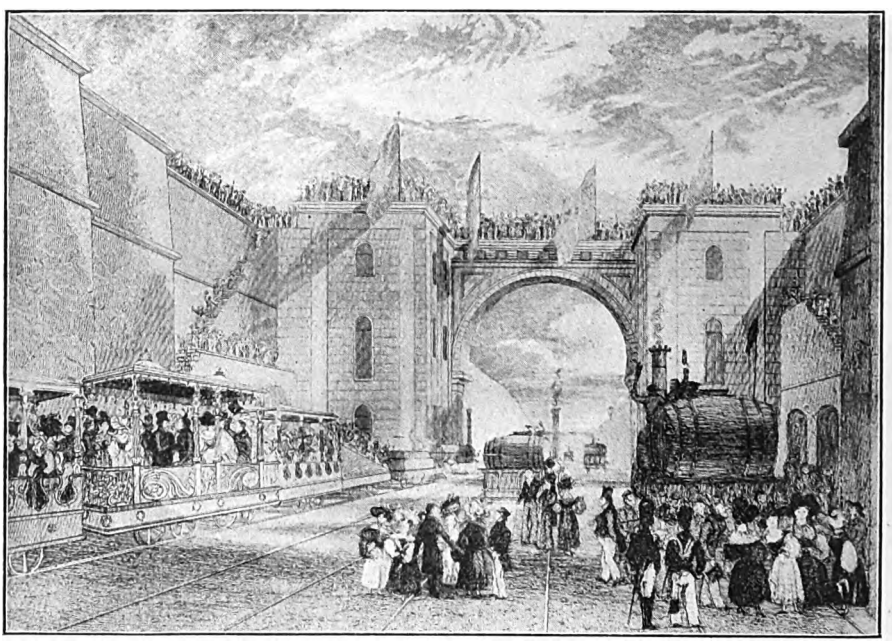
Modern improvements have swept most of these relics into oblivion, and but few traces are left of the things that once were. The Moorish Arch has gone, though its abutments are there; the approach steps are but a *bas-relief* on one side only; and the southernmost of the three tunnels has been reconstructed out of all recognition. There still remain a few traces of the original scheme, among which may be noted the battlemented wall on the surface level above the tunnel mouths. This piece of decoration matched the Arch at the other end of the cutting. There are also two small tunnels running from the cutting, but at right angles to it, to the site of the hauling engine that pulled the trains up out of Lime Street. These accommodated the pipes conveying steam from the boiler house at Wapping Cutting to the winding engines.

The original passenger line tunnel, that on the north side, is still in use; here and there may even now be observed the notches which received the rope guides, and occasionally one of the actual guides. Just before emerging into the yard one may see the date 1829 carved on a stone arch in the roof. The tunnel mouth on this side is just as it was, save for two corners cut out of the face of the arch, to allow a modern wagon to have free passage, as the single line bifurcates very sharply almost before it has escaped from the darkness. In the yard a small portion of the old exterior wall of the station is still standing. It is interesting to note that the station at Edge Hill was constructed from the same plans as the one at Crown Street, as may be seen by a comparison with the buildings on the outward island platform at the former station, and pictures of the buildings at Crown Street at the time of the opening. The old stationary engine houses may also be seen, just in front of the bridge at the entrance to Wapping Cutting.

Crown Street is a long way from the centre of Liverpool, and in 1830 it must have been right out in the country. In consequence

Digitized by Google

of its awkward situation, the company determined to bring the line to a more convenient terminus, and a few years after the opening of the railway the section from Lime Street to Edge Hill was put in hand and opened for traffic on August 15th, 1836. This was another bold engineering feat for the period, for the tunnel involved is cut through solid rock and extends for nearly a mile and a half under the city. The grade is 1 in 88, and here again an endless rope was used for motive power instead of locomotives, owing to the steepness of the incline, and the enclosed nature of the tunnel, apart from the fact that the employment of locomotives was forbidden by the Picton Library, matching St. George's Hall architecturally. In St. George's Hall, by the way, is a statue of Henry Booth, first secretary of the Liverpool and Manchester Railway, and ancestor of the Booth family of steamship fame. He assisted Stephenson in the various locomotive trials that took place before the opening of the line, and was the designer of the type of tubular boiler which was used in the *Rocket* and which contributed so greatly to that engine's success at Rainhill. He was also the inventor of the screw-coupling, still in general use. He is represented, appropriately enough, with a screw coupling in his hand; he died in 1869. The North



From an old print.] [*Photo, L.N.W.R.*

OPENING OF THE LIVERPOOL AND MANCHESTER RAILWAY IN 1830.

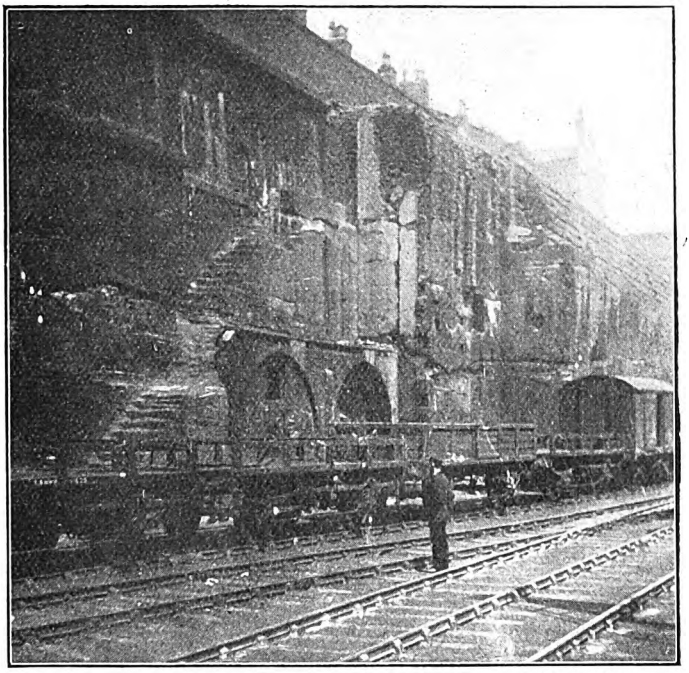
the Act. Indeed, this system of traction continued to be used until 1870.

The first station at Lime Street differed materially from the present one, both in accommodation and appearance. To-day, the front of the station is occupied by a fine hotel, its imposing design rendering it a worthy companion to adjoining buildings. Lime Street, Liverpool, provides, indeed, one of the finest city prospects to be found anywhere, as it slopes gently towards the river, with the North Western Hotel facing west on the higher side. Opposite, on an island site, stands St. George's Hall; and on the north side are the Walker Art Gallery and Western Hotel has over three hundred bedrooms and remarkably handsome public rooms: it is a favourite *pied-à-terre* for travellers arriving or departing by ocean liners.

But if the exterior of the station is imposing, the interior is also, in a different way. Having been twice enlarged the station is now of considerable extent. There are eleven platforms of approximately equal length and some short bays. The roof consists of two arches, with spans of 219 and 166 ft. respectively. Large as it is, however, its resources are severely taxed at times, especially between twelve and two on a fine Saturday in summer. The great

Digitized by Google

difficulty is that it is virtually impossible to extend the station lengthwise, although trains persist in getting longer and longer. Therefore it is sometimes necessary, in the case of an outgoing train, to place the engine and a few vehicles at one platform, and the main portion at another, until it is nearly starting time; while an incoming train may require the rear vehicles to be removed by a shunting engine before they can reach a platform. Such proceedings inevitably occasion delay; but it is difficult to see what else can be done. It is virtually impossible to lengthen the platform roads at the street end, and the cost of doing so at the other would be almost prohibitive owing to the high ridge of rock which here crosses the town. More space is also needed in the circulating area. The cab entrance for incoming passengers is from Lord Nelson Street, on the northern side of the station.



Photo] [*Basil Mercer.*

THE REMAINS OF THE STAIRWAY TO-DAY.

Until 1890 there were only two lines between Lime Street and Edge Hill, but the traffic had increased so greatly that doubling became imperative. When this work was being carried out the tunnel was opened out and converted into a cutting.

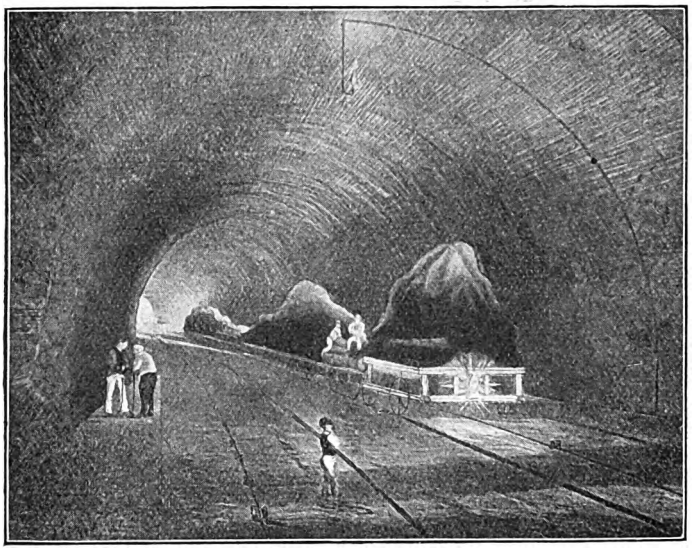
Before this tunnel was opened out, it was usual at Edge Hill to light the gas lamps in the carriages for the darksome finale of the journey. In still earlier days, oil lamps were lighted and wheeled round on a barrow, a porter on the platform throwing the lighted lamps to another man on the roof of the train, who placed them in the openings in the coach roofs. But previous to either of these methods, there was used for this journey a quaint form of lamp which hung outside the window of the compartment, being suspended from a rod terminating in a hook which fitted into a socket in the roof just above the door.

In addition to being an important station Lime Street is the headquarters of the divisional superintendent, Mr. W. M. Turnbull. The main offices adjoin No. 1 platform, and comprise some of the original buildings of the Liverpool and Manchester Railway. Mr. Turnbull's own office is the original Board Room of the Director's of the Liverpool and Manchester Railway. As in the case of the station, the original accommodation has proved inadequate, so new additional offices have been built on the Skelborne Street side of the station.

Examination of a map of the London and North Western Railway system in the Liverpool area, will show how extensive are the traffic possibilities. It is true that there is only one route out of Lime Street; but it has four very busy roads as far as Edge Hill Junction (or rather series of junctions), on the south side are the Wapping Tunnel and Crown Street lines, and on the north the long tunnel line from Waterloo Goods station (opened in 1849), while immediately to the east there is quite a maze of avoiding lines and connecting spurs.

At Edge Hill passenger traffic follows three routes. To the north is the line to Bootle and Alexandra Dock, with a branch to Canada Dock from Spellow (opened in 1870). To the south is the line to Crewe,

Digitized by Google



Photo] [*L.N.W.R.*

IN WAPPING TUNNEL WHEN ROPE TRACTION WAS USED.

with junctions for the Garston branch at Allerton, the Widnes, Warrington and Stockport line at Ditton, and the Chester line at Runcorn. Last, but not least, there is, straight ahead, the old line to Manchester with four tracks as far as Huyton. This line serves Manchester, Leeds and Hull, with branches to St. Helens, Wigan and Rainford from Huyton, St. Helens and the "Clockface" line (the original St. Helens and Runcorn Gap Railway, opened in 1832), the main line from Newton-le-Willows, and Leigh and Bolton from Kenyon (this is also a line dating from the early 'thirties).

The Liverpool Railways have to face severe competition from an efficient, rapid and extensive service of electric trams worked by the Corporation, but a railway has always advantages over the best methods of street traction, and this fact, coupled with cheap fares and contract rates, and frequent and comfortable trains, has done much to win back suburban traffic lost at the outset. In other words, tram competition has been met by increased facilities. Moreover, there are many places not served by the trams at all, and others to which, because of the distance, they cannot offer anything like a competitive service. Be all this as it may, there is a heavy local traffic on the Crewe line with its branches, and an equally heavy traffic on the old main line to Newton, while even the Bootle branch, primarily a goods line, is busy in the morning and evening.

Turning to the long distance business done at Lime Street, we find this extraordinarily extensive. First of all the Liverpool and London trains claim our attention. It will be remembered that in the early days the Grand Junction Railway connected with the Liverpool and Manchester at Newton, but in 1869 the Mersey was bridged at Runcorn and some six miles of distance saved. Runcorn Bridge is a notable engineering feat, but in view of its cost and difficulty of erection the fares are still based on the old and longer mileage. Another improvement was carried out about 1890, when the line from Edge Hill to Ditton Junction was doubled, and the old and inadequate stations replaced by suitable modern structures. Mossley Hill, with two island platforms and ample roofing, is a good specimen of a suburban station, and all its neighbours are commodious and convenient.

To give the history of the express service between Liverpool and London would need more space than the limits of this article afford, but a few remarks will be in place. In 1841 the morning mail left Euston at 9.45 a.m. and travelling *viâ* Birmingham, Crewe and Newton reached Liverpool at 6.45 p.m., a journey of nine hours. In 1876 the 12 noon *ex*-Euston took exactly five hours to get to its destination, and in 1900 the time was further reduced to 4¼ hours. To-day the best time is only 3 hours 35 min., by the 6.0 p.m. from Euston, which runs without a stop to Edge Hill in 3 hours 28 min.; this is a noble train, with its five dining cars and modern corridor coaches, and in spite of its 400 ton load one engine is easily able to maintain exact schedule time. The other principal expresses from and to London are very little inferior to this in point of time, and the whole service is an example of British railway practice at its best. The stock used on these expresses is exceptionally good; there are restaurant cars on all the important services

Digitized by Google

and sleeping saloons on the night express. Even in the 'seventies luxurious stock was run on the London-Liverpool trains in the shape of special saloons on the day trains and, though dining cars had not appeared on English railways, sleeping saloons were running regularly from Euston to Liverpool and Manchester at that early period.

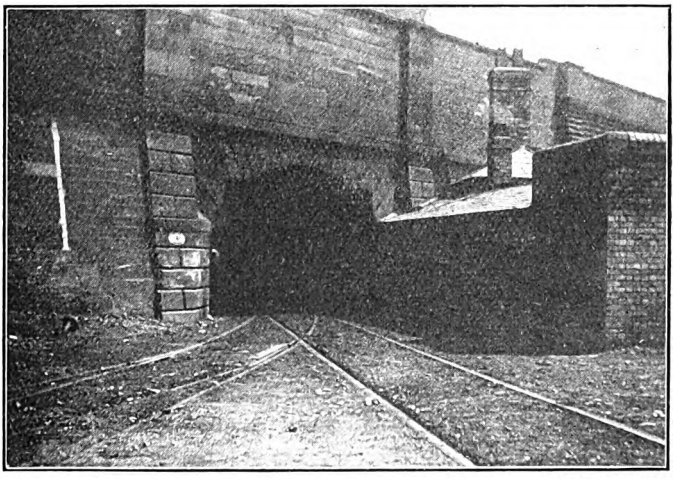
Other important services using the line to Crewe are the Birmingham expresses. Here the spur of competition has been absent, but the service is very creditable, the best time being 2 hours 5 min. Then there are the trains serving the three Welsh Wells and Swansea, and the North to West services *viâ* Crewe, Shrewsbury, Hereford and the Severn Tunnel to Bristol and the West of England. There is also a route *viâ* Birmingham and the Midland Railway and connections to Bath, Southampton and Bournemouth. Branching off at Runcorn is the important Chester line giving access to North Wales, Holyhead and Ireland.

Coming now to the old main line, the celebrated forty-minute express services between Liverpool and Manchester call for first attention. These trains not only serve Manchester, but many are through expresses for Leeds, Hull and York, with a special Scarborough train every summer.

The St. Helens and Wigan line, which leaves the Manchester route at Huyton, is now shorn of some of its glory, for, since the agreement between the London and North Western and Lancashire and Yorkshire Railways, the Scotch trains use the latter company's route from Liverpool to Preston, greatly to the convenience of the travelling public. There are still, however, some important through services worked over the St. Helens line, notably the Blackpool and Lake district trains, a connection being made with the Furness Railway at Carnforth.

There is one service on the Alexandra Dock line that deserves mention, the Edge Hill and Southport service. By means of the North Western trains over this route passengers are given good connections at Edge Hill with all the southern part of the system; through carriages from London are detached from certain expresses there, and taken on without loss of time or change of station, while even when there are no through vehicles the route is a very useful one, saving as it does a drive across Liverpool.

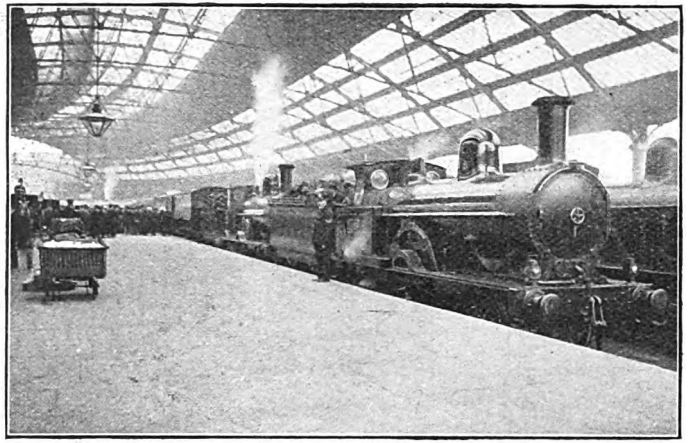
So much for the passenger traffic: the goods business of the London and North Western Railway in this district is equally interesting and enormous in volume. To quote Macaulay, "every schoolboy knows" of the Liverpool Docks, and anyone who has once seen their extent, and business will understand that the local railways are kept busy in ministering to the needs of such an undertaking. Following the river the Dock Board has constructed a railway, with lines branching off to the various docks and warehouses. The London and North Western Railway has no fewer than four lines giving access to the dock lines, the Wapping line mentioned before, the Waterloo line from Edge Hill to the Waterloo Goods Station through an almost complete tunnel length of 3,558 yards, and the Bootle branch which bifurcates at Spellow and gives direct access to the Alexandra and Canada Docks. It will, of course, be realised that the sooner the railway company can get the traffic off the dock lines on to its own the quicker it will travel, as all trains on the former system of metals are obliged to have a man with a red flag walking in front. This procedure wastes a great deal of time, and unless the trains are got away from such hampering conditions as soon as possible congestion is sure to take place.



Photo] [*Basil Mercer.*

THE ORIGINAL TUNNEL AT CROWN STREET.

Digitized by Google

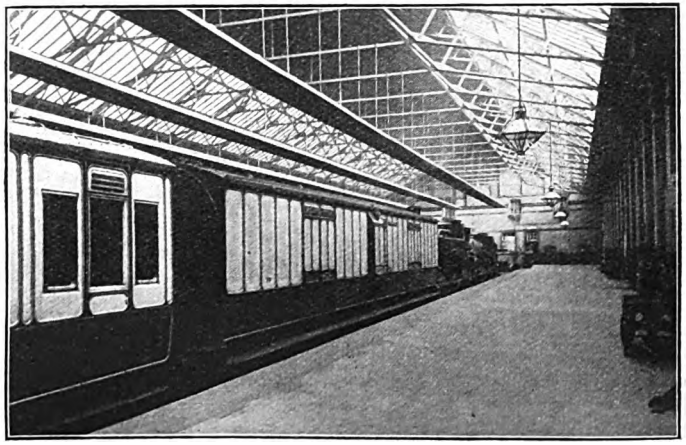


Photo] [*L.N.W.R.*

A SPECIAL TRAIN ARRIVING AT LIME STREET STATION.

Photo] [*L.N.W.R.*

CIRCULATING AREA, LIME STREET STATION.



Photo] [*L.N.W.R.*

RIVERSIDE STATION.

Photo] [*L.N.W.R.*

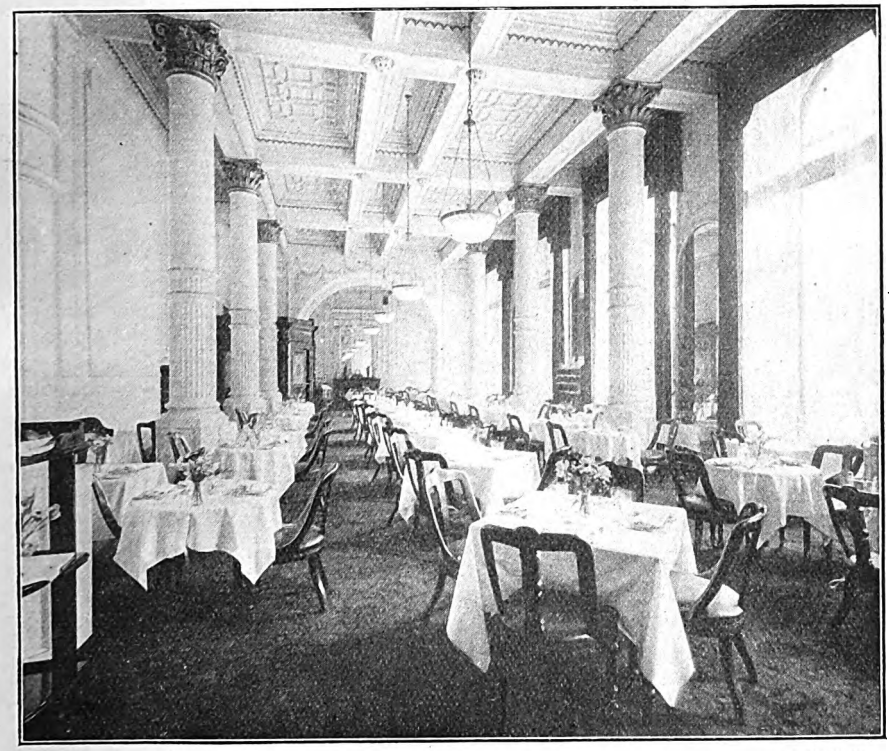
RIVERSIDE STATION.

Digitized by Google

Thus the value of these approach lines is easily seen, but not content with that the company have laid out a wonderful system of lines at Edge Hill by means of which conflicting train movements are reduced to a minimum. At this point also are Footner's famous "gridiron sidings," For handling traffic in the docks themselves handy little tank engines built at Crewe are used. They are of the 0-4-2 type, but owing to the trailing wheels being mounted on a pony truck, they can traverse any curve that an ordinary wagon will pass, while not straining the track nearly as much as an engine on four wheels only would do.

The London and North Western Railway also does a big dock business at Birkenhead and Garston, and at the latter place it owns and works the docks. Two interesting features about the Garston Docks are the enormous export coal traffic and the fact that this port is the harbour *par excellence* for the West Indian banana trade. This now popular fruit comes over the seas in vessels specially built to admit of the perishable cargo being protected against sudden changes of temperature, while the unloading is done by placing the bunches on endless bands, thus enabling the operation to be carried out with a minimum of handling. At Garston there are two routes for the traffic, one leading to Allerton and Liverpool, the other to Speke and Ditton Junction.

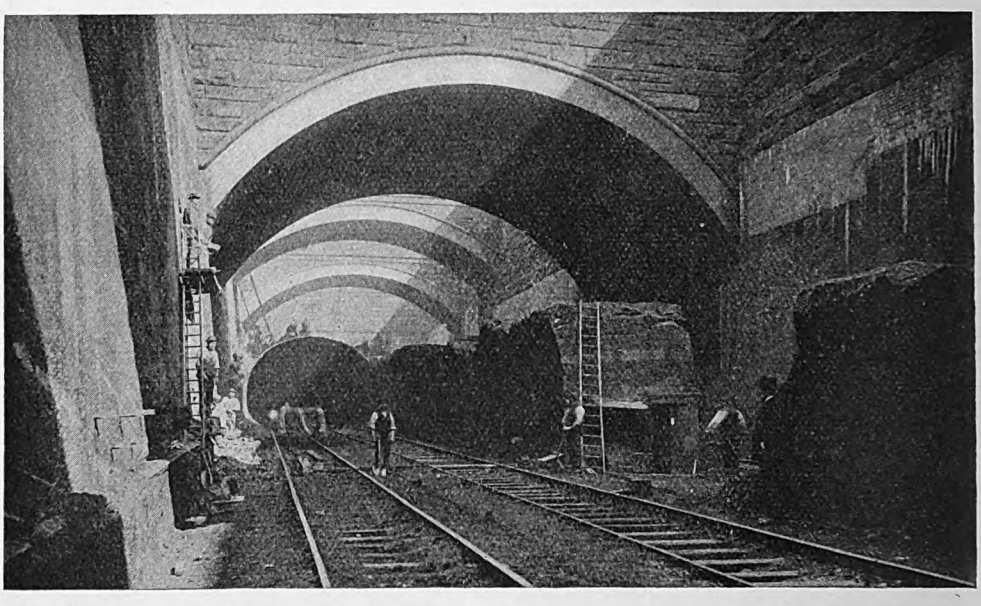
The landing stage at Liverpool is adjacent to the dock lines, but, except in the case of the "American Specials," passenger traffic is not conveyed there by rail. Through passengers for the Isle of Man, North Wales and Belfast steamers, etc., are transferred in wagonettes from Lime Street to the stage, or the various docks where the steamers are berthed. Apart from summer excursionists there is quite a big volume of traffic this way, many people preferring to go to Ireland, for example, with a long sea passage which gives opportunity for a good night's rest on the way, in preference to the more expeditious routes where there



Photo] [*L.N.W.R.*

COFFEE ROOM, LIME STREET HOTEL, LIVERPOOL.

Digitized by Google

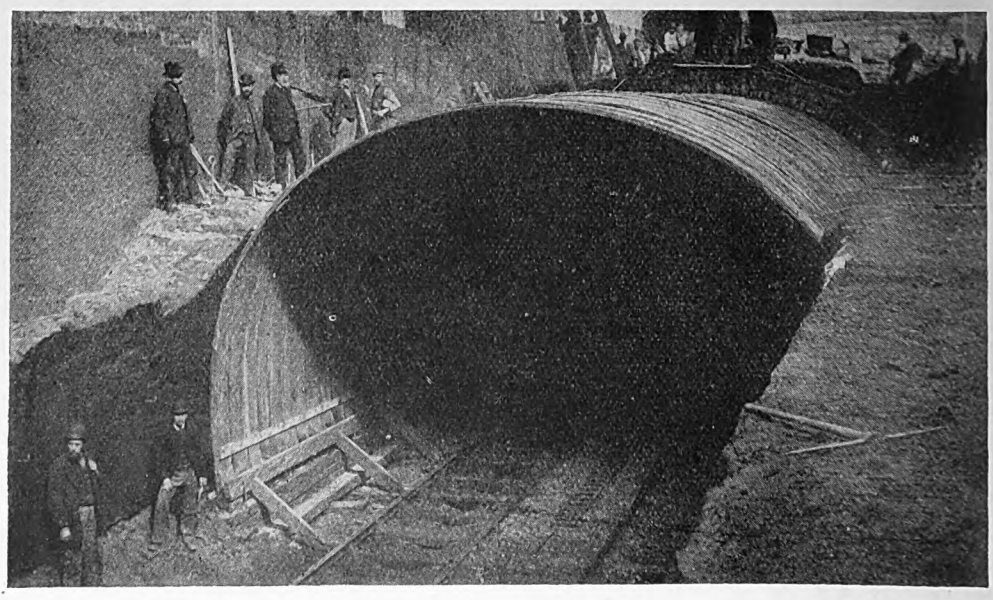


Photo] [*L.N.W.R.*

LIME STREET: EDGE HILL WIDENING.

is more rail travelling. Boats leave Liverpool regularly for Cork, Dublin, Drogheda, Belfast, Glasgow, the West Coast of Scotland, Plymouth and even London, so the passenger who likes marine journeys has plenty of choice.

The direct service from Euston to Liverpool (Riverside) in connection with the Atlantic liners is one that the North Western are justly proud of. Riverside station, contiguous to the Landing Stage, was opened in 1895 and has been a boon to trans-Atlantic passengers ever since. The trains working this service are made up of



Photo] [*L.N.W.R.*

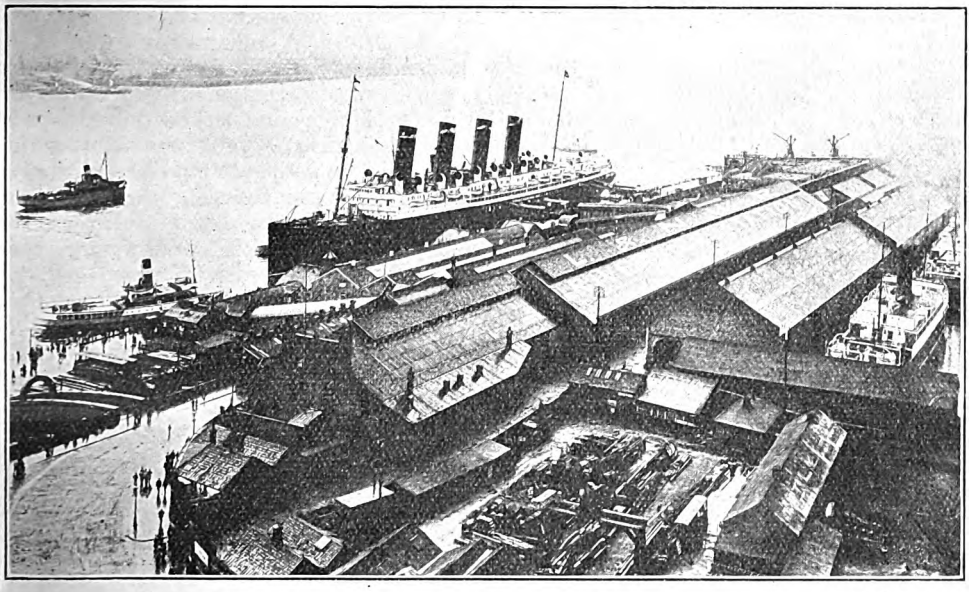
LIME STREET: EDGE HILL WIDENING.

Digitized by Google

the American Special stock, mostly consisting of twelve-wheeled coaches weighing about 40 tons apiece, thus ensuring the perfection of smooth travelling. The accommodation provided by these trains has been frequently described, so it is not necessary to go into full particulars here. It may, however, be mentioned that these are the most luxurious trains running in the British Isles without supplementary fare. The compartments are sumptuously fitted up, and in addition a number of the coaches are divided up into charming little drawing rooms furnished with movable arm chairs like the public rooms of a high-class hotel. Dining cars are run on all these trains, so there is no fear of the traveller leaving England's shores hungry or thirsty. The trains run non-stop from Euston to Edge Hill, where the main line engine is detached and two small oil burning and condensing six-coupled dock engines substituted. It then traverses the Waterloo Tunnel, passes through the goods station of that name, and so into the Riverside Station, from which it is only a walk of a few yards to the liner berthed alongside.

A short description of what happens on a day when one or more big ships are due to leave Liverpool will, perhaps, give a good idea of the proceedings. On the eighteenth of April of this year the *Mauretania* and *Teutonic* were sailing. Four special trains were needed to convey the passengers, the three first being for the big Cunarder. The first train arrived at Edge Hill at 12.53 p.m., having left Euston at 9.15 a.m. with one engine, *F. S. Wolferstan*, and a load of 416 tons empty, the run of 193 miles taking only 3 hours 38 min. Ten minutes were spent while the engines were changed and the train arrived at Riverside at 1.15 p.m. Here it was rapidly unloaded and taken out at 1.25 to make room for the second train which came in at 1.33. This was a lighter train than the first, being only 282 tons net. Again, all the business of unloading was got through quickly, taking only seven minutes this time. The third train, weighing 391 tons, came in at 2.8 p.m., and this was the last of the *Mauretania* specials. About half an hour later the famous liner left the stage. At 3.30 p.m. the fourth and last train, of 273 tons, came into the station, and the passengers found the *Teutonic* ready and waiting for them. At 4.30 p.m. she followed the *Mauretania* down the river. Similar methods are followed when a homeward bound steamer arrives.

There is also a considerable emigrant traffic dealt with by the London and North Western Railway at Liverpool, but this is conducted at Lime Street, the emigrants being taken down earlier in the day to the Landing Stage by road and thence by the



Photo] [*L.N.W.R.*

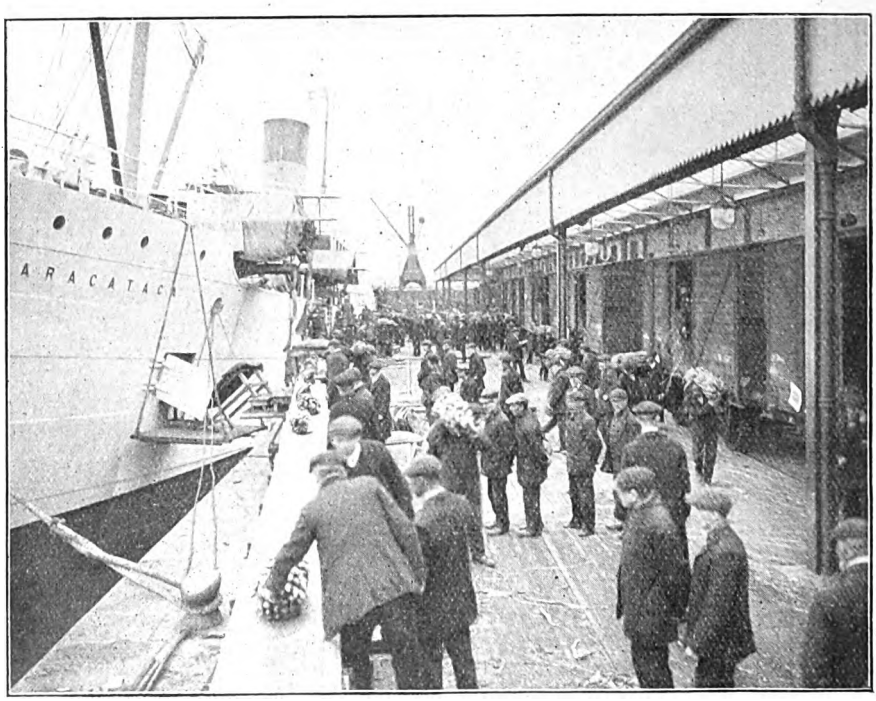
RIVERSIDE STATION, LIVERPOOL, SHOWING THE *Mauretania* ALONGSIDE.

Digitized by Google

MR. W. M. TURNBULL.
District Superintendent: Northern Division
London and North Western Railway.

liner's tender on board, before the ship is moored at the stage

Mr. W. M. Turnbull, Superintendent in charge of the Northern Division of the London and North Western Railway, with headquarters at Lime Street station, commenced his railway career in the District Goods Managers' Office at Rugby, where he went through all departments. He was then sent to Atherstone station, dealing with goods traffic, afterwards returning to Rugby for a time. He was then sent to Coventry as a canvasser, eventually being appointed District Canvasser. In due course Mr. Turnbull was removed to the Traffic Superintendent's office at Chester, staying there for about two years, afterwards going to Lime Street, Liverpool, as Time Table Clerk under the late Mr. James Shaw. A year or so later a vacancy for an assistant to Mr. Shaw occurred, and Mr. Turnbull was appointed, occupying this position for two years. His next appointment was at Birmingham, as assistant to Mr. Entwistle, and when the latter gentleman was removed to Chester Mr. Turnbull became Superintendent at Birmingham, remaining there until appointed to his present position, in charge of the Northern Division, the largest and most important district, from the traffic point of view, of the London and North Western system.



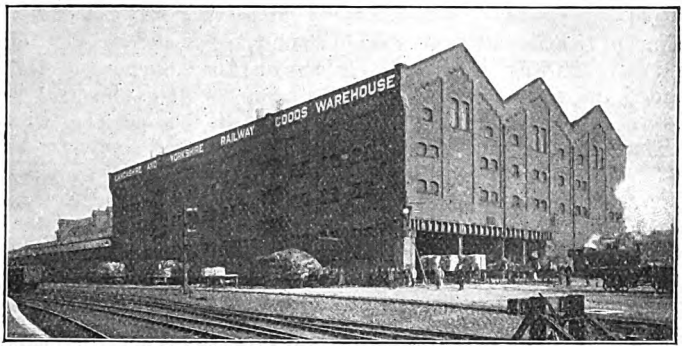
Photo] [*L.N.W.R.*

UNLOADING BANANA BOAT AT GARSTON DOCK.

Digitized by Google

Railway Goods Warehouses.

By W. F. LAWRENCE.



Photochrom Co.] [*London.*

A MODERN GOODS WAREHOUSE, LANCASHIRE AND YORKSHIRE RAILWAY, BOLTON.

THE handling of traffic at busy passenger stations possesses a fascination for all interested in railways, and opportunities for interesting and educating oneself in the subject are ever present; but that is not so in connection with the handling of goods traffic, and it is therefore purposed to give some particulars of the lay-out, equipment, and working of goods warehouses, without detailed reference, however, to any particular station, seeing that there is not that scope for divergence in structural or operating arrangements in a goods station which exists at passenger centres.

Goods warehouses may be divided into three classes, (a) town warehouses dealing with goods forwarded from and received for delivery in the town served by the goods station, (b) tranship and interception sheds handling also town traffic, and (c) warehouses allocated to specific descriptions of traffic.

Warehouses coming within the category of class (a), although the most numerous, are generally of secondary importance, as they are chiefly to be found at comparatively small stations where the whole of the work can be concentrated on one bench, or all the outward, or forwarded, traffic can be dealt with on one platform, whilst the inward, or received, traffic is handled at another, a cart-road running down the centre of the shed for the accommodation of road vans, lorries, carts, or other road vehicles. There are exceptions, as, for instance, in the case of a large town where one railway company possesses two or more goods stations, one of which may be set apart to deal with the whole of the town traffic, and another used exclusively as a tranship centre; or probably one may deal with both town and tranship goods and the other with traffic for a certain direction only, or with goods of specific classes.

So far as the lay-out, equipment, and working of this type of warehouse is concerned there is practically no feature which is not common to, or amplified in, the combined town and tranship sheds, and it is not therefore necessary to go into detail here as that phase of the matter will be dealt with later. A typical town shed of a moderately sized provincial centre is illustrated in the photograph of Harrogate Goods Warehouse on page 196.

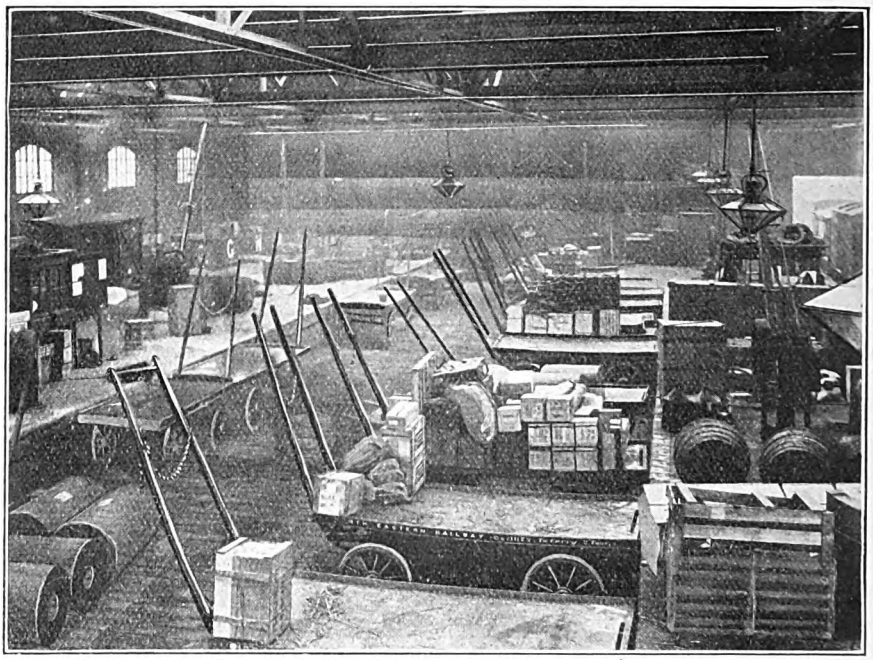
The second class of goods warehouse, wherein goods to and from the town, and traffic received from outlying stations for transhipment, are accommodated, is that which presents the greatest amount of interest. The plan of such sheds varies considerably, and the same may be said of the equipment and working conditions. In such warehouses it will generally be found that there is a cart-road at each side running the full length of the platforms, one for road vehicles bringing traffic in from the town for despatch, and the other for the loading of vans and lorries with traffic for delivery. In some large warehouses dealing with town and tranship traffic the latter has to be unloaded at one side and carted to the forwarding benches, but generally the forwarding and receiving benches are situated one at each side, with platforms for unloading and reloading tranship traffic between, a deck running the whole width of the warehouse at one end. The number of intermediate stages provided depends upon the amount of traffic to be handled daily; in many instances only one is required, whilst in the larger warehouses the number may be half a dozen. Where there is only a single tranship platform, this will generally have a line of rails on either side, each being

Digitized by Google

adjacent to a line accommodating the inward and outward wagons respectively, the former loaded and the latter empty. This arrangement is shown diagrammatically in Fig. 1.

The objection to a warehouse of this pattern is that the position of the transhipstage between two sets of rails on either side causes a long barrow-haul from that bench to the outward stage. Whilst it is possible to unload two series of transhipwagons simultaneously, there is no possibility of reloading the transhipsdirect into outward wagons, except by wheeling the goods round by the transverse stage, unless bridges are placed at intervals from transhipto outward bench, which, of course, means that the full standage accommodation for wagons is not available. This disability may be avoided by the abolition of the transhipbench altogether and the provision of one pair of rails upon which wagons containing transhipsmay be placed between the inward and outward benches, access to the benches for carts being provided at the end of the warehouse. This design is shown in Fig. 2.

The latter type of warehouse, however, has an obvious disadvantage in the lack of accommodation for "standing" road vans, or drays, that is, vehicles which are kept at the side of the arrival bench for the purpose of loading with traffic direct from the inward wagons; but on the other hand the wheeling distance, in the case of goods to be transferred from the transhipwagons to the outward wagons, is reduced to a minimum, and in the event of the inward lines being used during part of the day for the accommodation of outward wagons (which is often necessary at many stations during the evening hours) the distance to be covered by the porters from the road van to railway wagon is also lessened. It must be remembered that it is not as a rule practicable for any one road vehicle to bring in a full load of traffic for one particular wagon. It is evident that at whichever platform a road vehicle is dealt with, a large percentage of the goods brought in must be transferred to the other stage for loading to railway wagons.



Photo] [*H. Milnes.*

GOODS WAREHOUSE, HARROGATE, NORTH EASTERN RAILWAY.

Both inward and outward benches are provided with weighing machines for the purpose of weighing goods before despatch (for calculating charges), or when received in loose order. Theoretically, all goods tendered to the railway company for conveyance should be weighed at the forwarding station, but in a very large percentage of

Digitized by Google

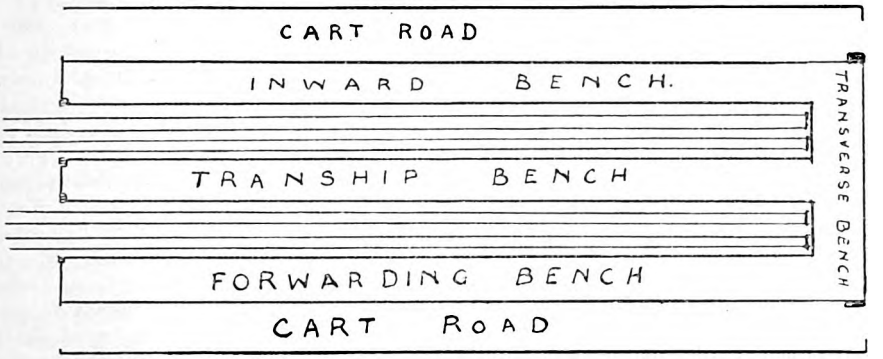


FIG. 1.

cases the weights as declared by senders on the consignment notes are accepted without question, on account of the necessity for dealing expeditiously with the traffic, especially during the "rush" hours of the late evening. When no weight is shown on the consignment notes it is the practice to weigh at the station, but there are exceptions, as in the case of certain standard packages where the regular weight is known or an agreed figure adopted. On the other hand, the declared weights are systematically checked with a view to detecting discrepancies. So far as the weighing of received traffic is concerned, this is virtually confined to consignments of pilferable goods, such as tobacco, silks, confectionery, wines, etc., and to goods which come to hand in loose condition, or which have the appearance of having been tampered with.

Cranes capable of lifting weights up to about 30 cwts. or two tons are fixed on the benches to facilitate loading and unloading operations, and these cranes are manipulated by hand or power according to the volume of such traffic as requires the use of a crane and the equipment and design of the warehouse. Hydraulic and electric power are in general favour for these cranes wherever available. Several examples of electric cranes constructed by Messrs. Royce and Co., Ltd., and installed in goods warehouses on the North Staffordshire Railway were illustrated in an article dealing with electric machinery on that line included in the July RAILWAY MAGAZINE. This firm has supplied to various railway companies many cranes of these and other types, suitable for railway goods warehouses, together with overhead travelling cranes and electrical capstans for haulage work. In fact, Messrs. Royce have been pioneers in the adaptation of electrical energy to lifting, hauling and winding appliances, and are installing quite a number of plants, as well as ordinary and "Royce" Patent Free Bollard capstans.

Powerful overhead electric travelling cranes or conveyors have been installed at certain large warehouses, but in some instances they have hardly justified their installation, on account of the limited number of occasions on which it is necessary to bring them into use, or structural consideration restricting the area of travel thus preventing economical user. In the case of a

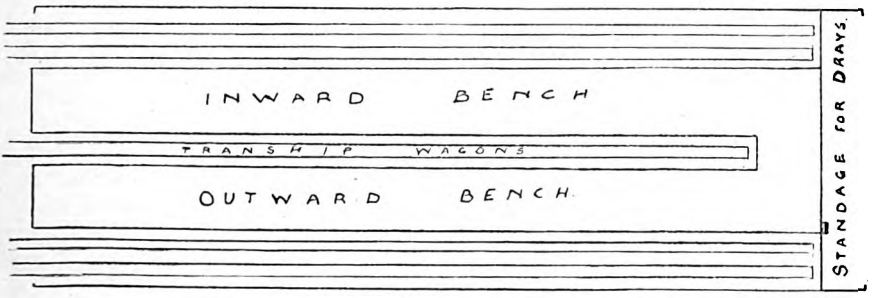
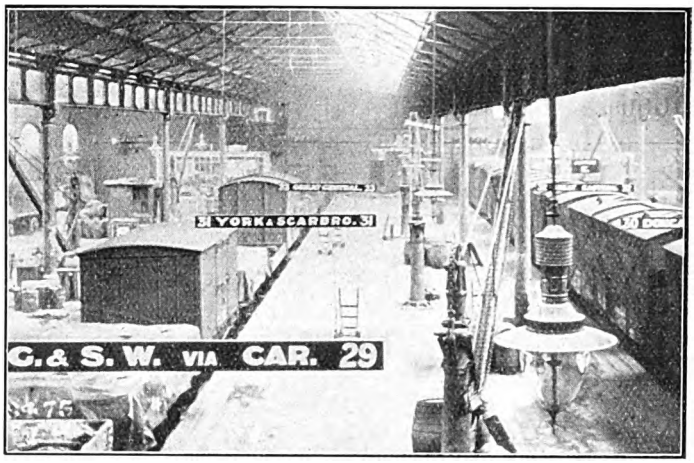


FIG. 2.

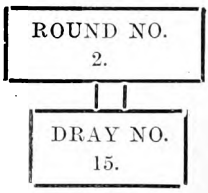
Digitized by Google



A LOADING BANK, SHOWING NAMEBOARD AND OTHER INDICATORS.

regular transfer of traffic over a large area, and for dealing with special loads, there is no doubt as to their serviceability, but where they are supplementary to the ordinary crane equipment it is mainly in cases where the character of the traffic necessitates their employment that their introduction is justified.

The use of nameboards suspended from the roof for indicating, in the case of outward and transhipment benches, the position of the outward wagons which are regularly loaded from the shed or the points at which goods for specific destinations are to be berthed is a desirable practice. As regards the inward benches, the positions in which the goods for delivery in the various quarters of the town are to be placed on the stage may be similarly indicated, when it is not practicable to transfer loads direct from railway wagon to road vehicle. In some warehouses numbers are used instead of nameboards, with a view to expedition in locating the positions of the various wagons or berths, but this is only found necessary at large centres, and although there is much to be said for the system, it is a fact that a name carries with it an individuality which does not attach to a number, and on that account there is probably less likelihood of wrong loading due to porters wheeling goods to incorrect wagons or berths when the station names are indicated. As a further precaution against goods being sent in a wrong direction it is the practice at many stations to attach a board to the side of each wagon in process of loading on which is painted or chalked the name of the station for which such wagon is destined. This is an infinitely better system than that at one time commonly adopted of chalking the wagons themselves, as old chalk marks are apt to lead to confusion, giving the wagons much the same appearance as the travelling bag of a self-advertising globe-trotter. This system of using nameboards for wagons is also applied to the loading of goods to road vehicles for delivery, the names of the districts served by the respective vans or lorries being shown on a board placed across the raised shafts. At one warehouse with which the writer is acquainted, the number of each delivery round is suspended from the rafters above the respective positions at which drays for those rounds are loaded, and below each of these is placed a tablet giving the local number of each dray, thus:



By this arrangement each checker can see at a glance which road vehicle is being loaded for each round, and endorses the invoices for the goods accordingly.

So far we have dealt only with the equipment of general warehouses of moderate dimensions, and it is now proposed to refer to developments which have been found to be necessary to cope with a heavy flow of traffic at large centres.

The most satisfactory type of warehouse is generally that having an entrance and exit for wagons at opposite ends, and where practicable such an arrangement has as a rule been adopted. It is not very frequently however, that it is practicable to construct a double-ended warehouse, mainly on account of the difficulty in procuring sufficient land. The obvious advantage of a through warehouse is that it can be fed with empty or loaded wagons, as the case may be, from one end, and the wagons, after being loaded or unloaded, can be drawn out at the opposite end without holding up the work of the shed

Digitized by Google

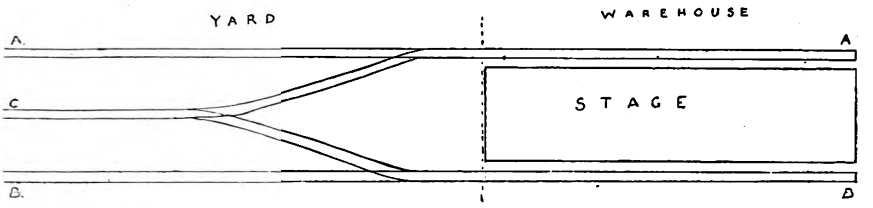
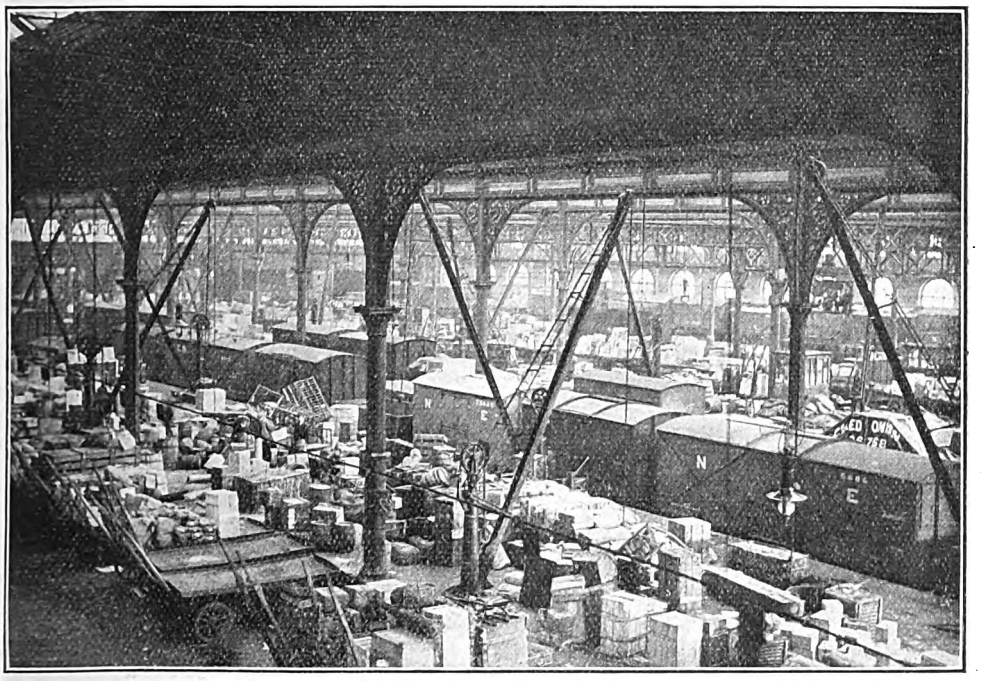


FIG. 3.

to the extent which is necessary when wagons have to be drawn out and put in from one end. To obtain full advantage from such an arrangement, however, it is necessary that the wagons standing nearest the departure end of the shed shall have first attention, and in the operation of loading this is not always economical, owing to the needs of other branches of the shed work proceeding concurrently. The largest warehouse constructed on the through principle of which the writer has any knowledge is the London and North Western Transhipping Shed at Crewe, but at that place, it is understood, it is the practice to unload practically all goods from wagon to stage, direct transhipping from wagon to wagon being the exception rather than the rule, and it is therefore easier than at most centres to make such a selection of positions for specific wagons as will ensure those required for despatch by the earlier trains being at the departure end.

In terminal warehouses the removal of wagons which have been loaded or unloaded, as the case may be, is frequently provided for by the installation of turntables or traversers which transfer the wagons to adjacent lines, *e.g.*, an empty wagon from inward to outward bench line. These may be fixed at the railway end of the shed, or placed at intervals along the benches, the latter being cut away and connected by drawbridges, lift bridges, or otherwise. Another method is to have a line laid to a transverse bench, at the terminal end of the shed, and by means of turntables pass wagons from the longitudinal to the



NEWCASTLE (FORTH) WAREHOUSE, NORTH EASTERN RAILWAY.

Digitized by Google

transverse bench, and from thence out of the warehouse to another turntable giving access to a siding running alongside the wall, or, in some instances, to a siding inside the wall but not provided with bench accommodation.

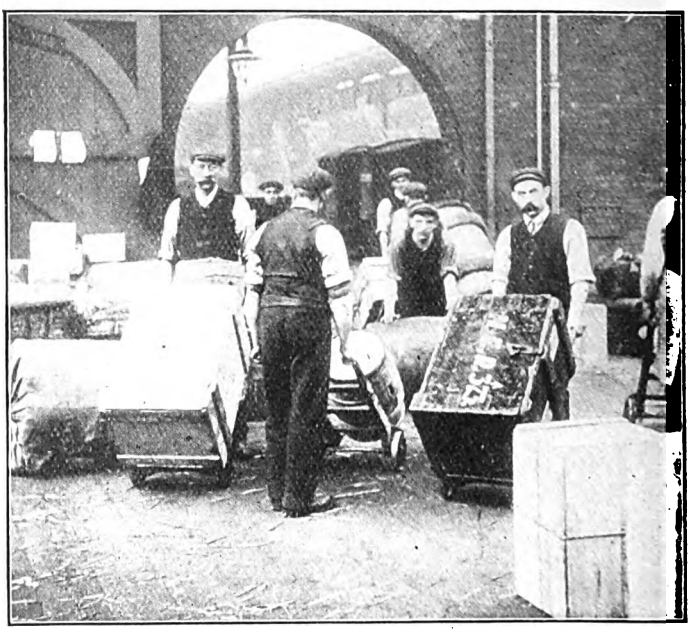
A simple but ingenious arrangement is in operation at the York General Warehouse of the North Eastern Company. There are two arrival lines in this warehouse, each capable of holding seventeen wagons, and these two lines are continued independently outside the warehouse. At the entrance to the shed they are connected to a third set of rails which runs between the outside extension, and the *modus operandi* of clearing and feeding the shed is as follows:—The yard pilot engine in the first place fills up lines A and B (see Fig. 3) with loaded wagons, and when those which are standing inside the shed have been dealt with, they are drawn away from the benches on to line C, and the wagons standing on the outside extension of A and B pushed forward.

At the Bolton shed of the Lancashire and Yorkshire Railway, a continuous flow of wagons through the warehouse has been assured by the construction of a loop extension railway at one end of the warehouse in the outside yard, round which the wagons are moved by capstans. A somewhat similar arrangement is also installed at one of the Manchester Warehouses of the same Company.

Although as a general rule the open-ended warehouse is much to be preferred to the terminal type, the extent to which a through warehouse has an advantage over the closed type will depend upon whether certain lines are reserved exclusively for loading or unloading purposes. If at certain benches unloading takes place continuously, then a through line is an undoubted advantage, but if it is the practice to load traffic up at the same bench as wagons are unloaded, then it follows that only a proportion of the wagons which have been unloaded are suitable for reloading, and as a consequence the unsuitable wagons have to be shunted out, whether the warehouse be dead-ended or not. Probably the greatest satisfaction can be obtained by a combination of the two types, which will admit of certain lines being continuous and the others run into bays. At the end of the bay platforms would be placed those outward wagons which experience shows will not be quickly filled, but into which traffic is loaded practically throughout the day as it arises, and in that position such wagons need not be disturbed until loading is completed; whilst the open lines would be used for inward wagons not required for reloading, or which, being used for an outward load, can be filled quickly.

The tendency towards an increased use of large-capacity wagons for general merchandise traffic runs counter to the advantages to be derived from a through warehouse, as with the employment of these large vehicles there is an inevitable reduction in the number of wagons loaded from point to point. This means that there is more likelihood of all the inward wagons being required for outward loading, and also that the outward wagons already set at the forwarding stages will take a longer time to fill.

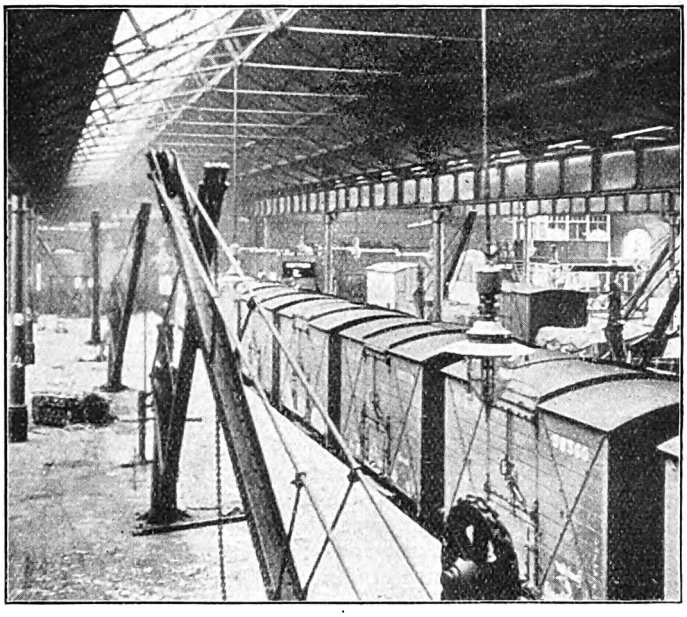
Another factor bearing upon the point under consideration is the relative proportion borne to each other by the forwarded and received traffic respectively at any



BARROW WORK ON A LOADING BANK.

Digitized by Google

particular warehouse. If a shed is a greater receiver than a distributor, then there will be a surplus of wagons entering, which it will be an advantage to pass right through the shed; but if the contrary is the position, then there will be greater opportunities for reloading the whole of the wagons entering the warehouse, and there will not be so much advantage in having an outlet at the further end of the shed.



CRANES INSTALLED ON A LOADING BANK.

In the case of a station dealing with transhipment traffic, the geographical position will have a large bearing upon the ability to utilise inward wagons for outward loading. For instance, if a shed is situated at a junction between two railways, a large proportion of the inward wagons will be found to be foreign stock, and, as is well known, there are limitations upon the extent to which such stock may be reloaded without incurring penalties for wrong sending or detention. It may be that the greater part of the foreign stock received at a particular station, A, belongs to Company B, whereas the bulk of the traffic which station A forwards is for Company C, or for its own line stations, and thus the fact that A receives a large number of foreign wagons is of no advantage, as they cannot be reloaded to any great extent. In such a case a type of warehouse which gives the best facilities for disposing of empties, and at the same time refilling with other empties, will be the most economical, so far as that aspect is concerned.

It would not be profitable to review in detail the working of warehouses devoted to specific classes of traffic or primarily to the storing of goods. Such warehouses are in the main provided for the storage of grain, wool, cotton, dried fruits, shipping traffic, etc., and their internal arrangements only vary in accordance with the peculiar requirements of the traffic or the trade associated therewith. In cotton warehouses, for instance, one may find travelling cranes after the pattern of those referred to later as being installed at the Bradford Wool Warehouse, these being used for the hoisting of bales into position for storage, and only requiring a passage way for working operations equal to the width of a single bale.

Grain warehouses and wool sheds are provided with jiggers outside by means of which the sacks or bales are hoisted through "pent houses" to the upper storeys, whilst inside a similar movement is made at some sheds by taking the traffic up through trap doors. At sheds where practically all wagons loaded are of one type, the provision of sheet gantries standing somewhat higher than the wagons enables the sheeting to be performed quickly and easily. Again, in some warehouses of this class the benches are constructed of unusual height, in order to facilitate the rolling of bales into wagons without the aid of a crane.

With the increasing tendency to despatch goods in small consignments, necessitating their undergoing the process of transhipment *en route*, coupled with the insistent demand for rapid transit, mechanical operation in goods warehouses is a subject which has for some time been engaging the attention of the officers entrusted with the discharge of the functions of the railways of this country, so far as they relate to the expeditious handling of merchandise traffic coming within the category of "smalls," or less than full wagon loads. Much of the loss of time which now takes place in handling goods is due very largely to inadequate

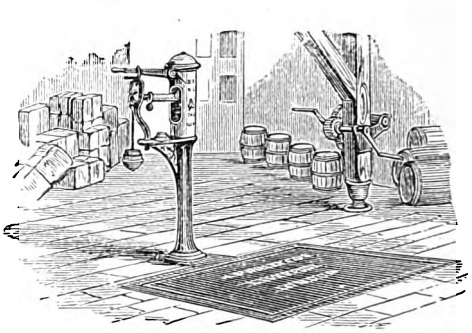
Digitized by Google

warehouse accommodation, but in the great majority of instances it is impracticable or impossible to increase the size of the structure, and the only solution of the difficulty appears to lie in the direction of expediting the speed of the actual transfer operations, bearing in mind that mere increase in area would not necessarily mean increase in speed, but more than probably the reverse.

With this end in view various suggestions have been made from time to time—some practicable, some otherwise—for expediting the handling of traffic by the adoption of mechanical means, but up to the present time progress in that direction has not been very marked. The introduction of automatic weighing machines may be regarded as the first step, one company at least having tentatively installed such machines at three or four of their larger warehouses, each differing in detail points of construction or operation. It has been found that these machines save approximately forty per cent. of the time required by the beam scale with loose weights for weighing goods, and they have the further advantage that there is no risk of the misplacement of loose weights and consequential inconvenience. Automatic weighers also generally take up less stage room, and this is again an advantage in warehouses the accommodation in which is limited.

In cases where there is difficulty in placing a wagon containing heavy or bulky goods in close proximity to a fixed crane, it has been found to be advisable to employ a light portable crane and deal with the wagon in the warehouse yard. These portable cranes

"NEW ERA" FIRE-EXTINGUISHER SUITABLE FOR INSTALLATION IN RAILWAY GOODS WAREHOUSES: THE VALOR COMPANY, LTD.



WAREHOUSE WEIGHING MACHINE: MESSRS. HENRY POOLEY AND SONS, LTD.

are generally in the form of a small hand crane mounted upon a dray which can be taken to any wagon standing in the yard as required. Such cranes are particularly useful when dealing with agricultural implements which, on account of their bulk and breakable nature rather than their weight, require a crane to lift them and a large area for radial movement.

Hand hoists and wagon loaders have been devised for the purpose of lifting packages, principally barrels, sacks of flour, grain, etc., into position and removing them from storage in warehouses. There is not the same scope for the use of such machines, however, in an ordinary goods or transhipment warehouse, but better results can be obtained from their employment in warehouses coming within class (c), to which reference was last made.

The power-propelled barrow is another aid to expedition in the transportation of goods traffic. It will convey a greater weight per journey than the standard hand-propelled barrow and also travel at a higher rate of speed. Particulars of such a barrow, the "Buckwalter Electric Truck" were given on page 349 of the April, 1914, issue of the RAILWAY MAGAZINE, and the use of barrows of such a type is being adopted by some of the most important British railways.

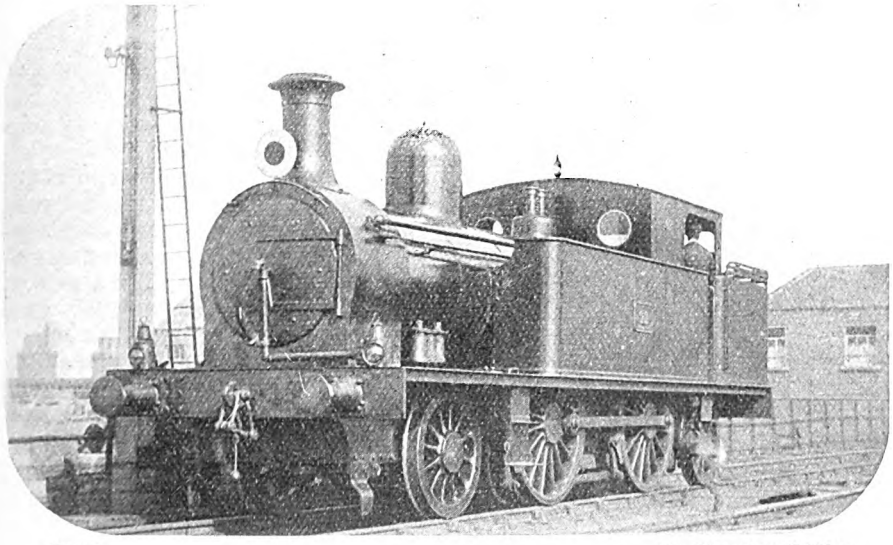
These are, however, more or less preliminary steps in the direction of mechanical handling of traffic, and one does not need to be a prophet to prognosticate a much wider adaptation of machinery to warehouse working. It is safe to say that the chief factor which is at the present time retarding development on these lines is the fact that most of the railway goods warehouses in this country were constructed many years ago, and in their present form are not suited to the introduction of mechanical methods of operation. Something on the lines of the

Digitized by Google

Gattie-Seaman proposal for the suggested London Goods Clearing House (with which all readers of the RAILWAY MAGAZINE are doubtless familiar), but of course in a much modified form, would be of considerable benefit to many goods warehouses. Present installations of that character are for the most part confined to warehouses which deal with certain classes of traffic specifically; for instance, at the North Mersey and Alexandra Docks Shed of the Lancashire and Yorkshire Railway there is a small railroad all round the bacon cellars. This was put down to save barrowing, and three or four boxes of bacon can be moved on one trolley simultaneously, whilst in the same Company's Bradford Wool Warehouse there are electric cranes on each floor which travel on a single rail above and below. In addition to their lateral movement these cranes can radiate in a complete circle and the whole of the floor area of the warehouse can be reached by them.

Further developments of mechanical operation may be looked for in the direction of belt conveyors, which are to-day being called into use for the transport of such divergent commodities as loads of coal from wagon to ship, and single letters from the Post Office wall letter boxes to the sorting rooms.

In matters of detail there are probably no two goods warehouses where the working conditions or arrangements coincide, but the foregoing may be taken as representing the general principles of railway warehouse operation. The clerical duties associated therewith have not been touched upon, as they do not generally come within the scope of the term "operating," but are more or less confined to the invoicing of goods between stations, registration of deliveries, checking of rates and charges, general correspondence and enquiries, etc., and the purpose of the writer in the present instance was to deal only with the actual transport and warehouse operations.

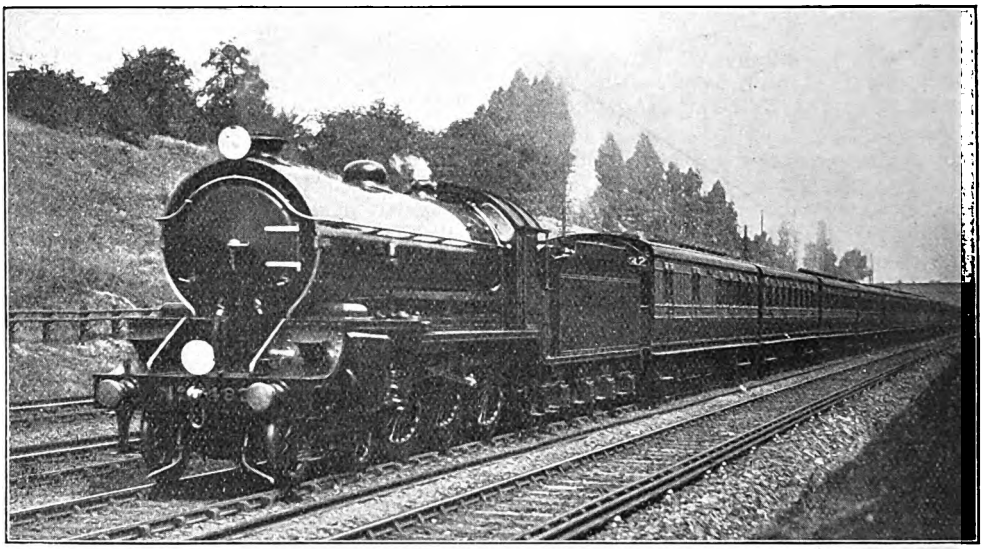


Photo] [*J. Macartney Robbins.*

DUBLIN AND SOUTH EASTERN RAILWAY.

2–4–2 tank engine No. 12, *St. Brigid*, outside Amiens Street Station, Dublin.

Digitized by Google



Photo] [*F. E. Mackay.*

LONDON AND SOUTH WESTERN RAILWAY.
11 a.m. West of England Express.
New superheater 4-6-0 locomotive No 482.

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

THE next subject for discussion in our tables of superheater express locomotive dimensions and proportions is that of the diameter of driving wheels. So far as the relation of this dimension to the performance of the locomotive is concerned, this is a subject in which theory and practice are not always in apparent agreement. That is to say, it does not by any means follow that the engine with driving wheels of the largest diameter shows the maximum capabilities in the matter of speed, nor does the provision of driving wheels of comparatively small diameter of necessity preclude the use of such an engine on the fastest express duty. It seems to me, indeed, that the influence of driving wheel diameter—within reasonable limits—on performance is so closely bound up with that of certain other important features of the design that it is impossible to judge of its effect on any independent basis. In the small-wheeled locomotive, for example, any restriction in size of the exhaust passages is likely to cause choking of the exhaust at high speeds, with a correspondingly increased back pressure in the cylinders, and the speed is thereby adversely affected. On the other hand the internal frictional resistance of a three or four-cylinder locomotive with driving wheels of moderate size may be so small, owing to satisfactory balancing arrangements, that this particular type will run more freely at high speeds than another two-cylinder type with much larger wheels. Theoretically, the diameter and stroke of cylinders being kept at a constant figure, any increase in driving wheel diameter involves a proportionate reduction of tractive effort, whereas a reduction in diameter, while increasing the nominal tractive effort, at the same time increases the speed of the reciprocating parts, the back pressure in the cylinders, and in this way the internal resistance of the engine as a whole. In theory, therefore, an increase in the diameter of driving wheels should increase the speed capabilities of the engine at the expense of tractive effort, while a reduction should have the reverse effect.

This is, of course, true enough in the case of extreme variations of diameter, the

Digitized by Google

mineral locomotive with 4 ft. 6 in. wheels hauling its 1,000 ton load at an average speed of 20 miles per hour, while the express locomotive with, say, 6 ft. 6 in. wheels, maintains freely a speed of 50 to 60 miles per hour, but only with a reduced load of 300 to 400 tons or so. Despite this, however, small-wheeled locomotives can show surprising speed performances at times, and many readers will, I do not doubt, have noticed such to be the case when six-coupled goods engines fitted with the continuous brake have been pressed into service for excursion or ordinary passenger trains. Some years ago the late Mr. Charles Rous-Marten published in these columns a table showing the maximum speeds that he had recorded with engines having driving wheels of different diameters, and this is of such interest in this connection that I take the liberty of reproducing it herewith :—

Type of Engine.	Maximum Speed.
3 ft. 0½ in. six-coupled ..	53·0 miles per hour.
4 ft. 1 in. six-coupled ..	64·2 ,, ,,
5 ft. 0 in. six-coupled ..	70·6 ,, ,,
5 ft. 6 in. four-coupled ..	74·0 ,, ,,
6 ft. 0 in. four-coupled ..	90·0 ,, ,,
6 ft. 3 in. six-coupled ..	93·7 ,, ,,
6 ft. 6 in. four-coupled ..	91·8 ,, ,,
6 ft. 8 in. four-coupled ..	102·3 ,, ,,
6 ft. 9 in. four-coupled ..	91·8 ,, ,,
6 ft. 9 in. six-coupled ..	88·2 ,, ,,
6 ft. 10 in. four-coupled ..	80·3 ,, ,,
7 ft. 1 in. four-coupled ..	91·8 ,, ,,
7 ft. 4 in. single-driver ..	83·7 ,, ,,
7 ft. 6 in. single-driver ..	86·1 ,, ,,
7 ft. 8 in. single-driver ..	91·8 ,, ,,
7 ft. 9 in. single-driver ..	90·0 ,, ,,
8 ft. 0 in. single-driver ..	81·8 ,, ,,
8 ft. 1½ in. single-driver ..	85·7 ,, ,,
8 ft. 6 in. single-driver ..	78·9 ,, ,,

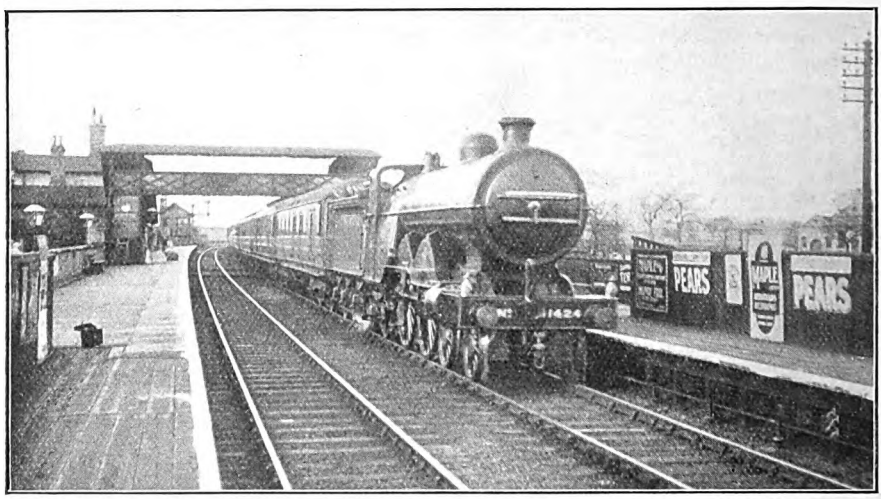
My own experiences have been very similar to those recorded above, although I have never been sufficiently fortunate to record a speed in excess of 90 miles per hour. I have, in all, five definite "90" records; one on the Great Western Railway, with a 6 ft. 8½ in. six-coupled locomotive; one on the London and North Western Railway, with a 6 ft. 3 in. six-coupled "Experiment," piloted by a 2–4–0 "Jumbo," in the descent of Shap incline; one on the corresponding Midland descent from Ais Gill, with a 6 ft. 9 in. four-coupled Johnson simple locomotive; one on the Great Central Railway, with a 6 ft. 9 in. "Atlantic," between Lutterworth and Leicester; and one on the Great Northern Railway, with a standard 6 ft. 7½ in. "Atlantic," on the Essendine bank. The collection of locomotives here cited—two of the 4–6–0, two of the 4–4–2 and one of the 4–4–0 type—is interesting as showing that the coupling of axles appears to have practically no effect on the free running of the engine at speed. Moreover, it will be seen that although four of the types mentioned have driving wheels between 6 ft. 7½ in. and 6 ft. 9 in. in diameter, the London and North Western "Experiment" has only 6 ft. 3 in. wheels. Mr. Rous-Marten's highest recorded speed with one of these engines—north of Shap—was one of 93·7 miles per hour; the best I have timed on the northern descent with an unpiloted "Experiment" is a maximum of 86·5 miles per hour at the same point. But at all times the "Experiments" have proved themselves extraordinarily speedy, and for such varied grades as prevail between Crewe and Carlisle they seem to be, when reasonably loaded, quite ideal engines. I always remember, as a specimen "Experiment" performance, the attaining of a top speed of 77·5 miles per hour by *Fortuna*, with a load of 310 tons, on so short a descending grade as 1½ miles at 1 in 180 to Preston Brook (preceded by an undulating road, with a slightly falling tendency); this, for a 6 ft. 3 in. six-coupled engine, I considered a remarkably smart achievement.

Referring again to Mr. Rous-Marten's table, we find that he recorded a speed of 53 miles per hour with 3 ft. 0½ in. wheels, and as high as 64·2 miles per hour with 4 ft. 1 in. wheels. These maxima, which were obtained on the 3 ft. 6 in. gauge, were timed, I believe, in New Zealand. The nearest approach to such speeds that I have seen under similar conditions in this country has been on the Great Eastern Railway, where the small 0–6–0 4 ft. side-tank engines of Mr. James Holden's design can put up remarkably smart times. The house in which I lived for many years commanded a good view of the Great Eastern Chingford branch between St. James' Street station, Walthamstow, and Clapton Junction—a very favourably graded stretch for up trains—and I have often timed fast up suburban trains across the Hackney Marshes at speeds well in excess of 50 miles per hour, and occasionally up to the mile-a-minute rate. Even the famous ten-coupled "Decapod" tank—Mr. Holden's *chef d'œuvre*—was officially timed at a maximum speed of 55 miles per hour down the 1 in 90 of Brentwood Bank, although the wheels had only a diameter of 4 ft. 6 in. With the standard 0–6–0 engines of many British lines, having wheels from 4 ft. 6 in. to 5 ft. diameter, I have frequently noted speeds up to and exceeding 60 miles per hour when

Digitized by Google

used on passenger service, and many of these engines are capable of speeds up to 50 miles per hour even on the level.

As we come to engines intended more particularly for passenger or express goods service, we find further enhanced speed capabilities. In the July issue, as may be remembered, I referred to a record according to which a maximum speed of 71·4 miles per hour was attained by one of the new North Eastern Railway 4-4-4 tanks of class D, having 5 ft. 9 in. driving wheels. The 4-4-0 G1 tender engine class of the same company (converted from 2-4-0, and known originally as the "Waterbury's," owing to a supposed unusual addiction to time-keeping, which, by the way, I have never yet noticed) been found practicable to work these engines on exactly the same expresses as the previous standard "Atlantics," despite the fact that the respective driving wheel diameters are 5 ft. 8¾ in. and 6 ft. 8¼ in. Indeed, the six-coupled engines have actually been found capable of a maximum rate as high as 93·2 miles per hour, with suitably large exhaust ports, and are credited with a maintained speed of 68·4 miles per hour on the level with a train of 312 tons behind the tender. The trains on which these locomotives work include the famous Paris-Brussels service, with times of 94 min. and 95 min. for the 95¾ miles from Paris to St. Quentin, and also the Paris and Calais expresses, allowed only 195 min. for the 185½ miles between the two



Photo] [*H. E. Ambrose.*

GREAT NORTHERN RAILWAY.

Up Leeds and Bradford Express passing Potters Bar.

4-4-2 locomotive No. 1424.

are also capable of unexpected speed at times, and I have recorded a maximum of 71·4 miles per hour on an almost level track with one of them. Further mention of this peculiar run will be found a little later on. These engines have 5 ft. 6 in. wheels. A maximum speed of 75 miles per hour has been officially claimed with one of the new "Moguls" (class H2) on the Great Northern Railway, which have 5 ft. 8 in. wheels.

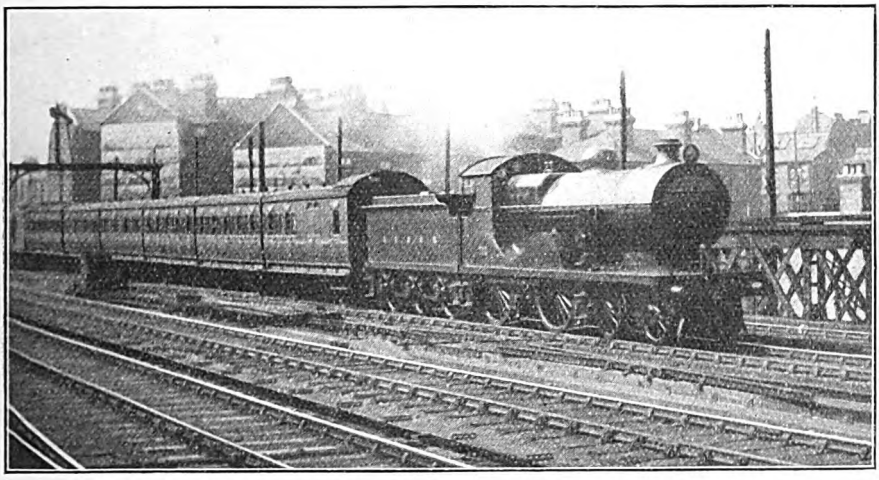
Among the best-known small-wheeled express locomotives in Europe are the extensive class of 4-6-0 4-cylinder compound locomotives of the Northern Railway of France, of which no less than 150 were put into service between 1909 and 1912. It has cities, inclusive of a 5-min. stop at Abbeville for water. Some of the heaviest duties—more especially the boat express train working—are now taken by the more recent 4-6-2 engines, a run with one of which was described in the January issue among my "best runs" of 1913; but the 4-6-0 engines are still very largely used on expresses of the first importance, as well as on fast goods trains of up to 1,000 tons weight.

The numerous 6 ft. coupled locomotives of this country are of various types, and many of them can show remarkable speed efforts when put to it. I have not seen a higher recorded speed than 75 miles per hour with one of the new London and South Western 4-6-0 superheater engines of Mr. R. W. Urie's

Digitized by Google

design, but the run mentioned in the *Times* of July 18th last is a remarkable tribute to their powers, both as regards load haulage and high speed. On this occasion the 11.10 a.m. *ex*-Waterloo, which was loaded to no less than 15 corridor eight-wheelers, including restaurant car—425 tons at least, with passengers and luggage—was taken to Salisbury, 83¾ miles, in 92 min., passing Woking, 24½ miles, in 28½ min.; Basingstoke, 48 miles, in 55 min.; and Andover, 67 miles, in 76 min. Our contemporary remarks that "several service slacks had to be observed"—possibly permanent way or signal checks, as I have never yet heard of any *service* slacks in force between Waterloo and Salisbury. I understand from another source that the engine was No. 489, of the "Robinson" superheater batch. I am hoping to secure some records of the work of these fine engines myself in time for insertion in the October issue. Among other 6 ft. types, the excellent work recorded in last month's article behind one of the 6 ft. superheater 4–4–2 tanks on the North Staffordshire Railway will be remembered, the load in one instance totalling 375 tons, while on the other hand a maximum speed of 64·3 miles per hour was touched. I am able to supplement these details by a brief account (referred to later) of a run with this train behind the 4–4–0 superheater tender engine No. 38, which has wheels of the same diameter, together with a further, and still finer run behind one of the large tanks. By the kindness of a correspondent I have also been favoured with details of a run with one of the Glasgow and South Western 6 ft. 4-4-0 engines, which is a substantial improvement on those I gave in the July number.

Proceeding a little higher in the list, we come to several well-known express locomotive types, nearly all of which are capable of very high downhill speeds. The earlier 4–6–0 engines, of Mr. Drummond's design, with 6 ft. 1 in. wheels, have been timed up to 83 miles per hour down the steep grades between Salisbury and Exeter. The large 6 ft. 3 in. 4-6-0 engines of the Lancashire and Yorkshire Railway have several times given me speeds in excess of 80 miles per hour, the maximum that I have recorded being 81·8 miles per hour in the descent from Orrell to Fazakerley, running from Manchester to Liverpool. In both these cases we have a four-cylinder engine, with all four cylinders high pressure and of equal size, and the effective balancing thereby secured doubtless contributes to their free downhill running. Of the "Experiment" 4–6–0 class on the London and North Western Railway I have already written, and the same remarks apply to the superheater development of this type, known as the "Prince of Wales" class. Curiously enough, the S2 class of the North Eastern Railway—a much larger boilered design, with 6 ft. 1 in. wheels and 20 in. by 26 in. cylinders (against the 6 ft. 3 in. wheels and 20½ in. by 26 in. cylinders of the last-mentioned engines)—does not appear to show anything like the same speed capacity, and



SOUTH EASTERN AND CHATHAM RAILWAY.

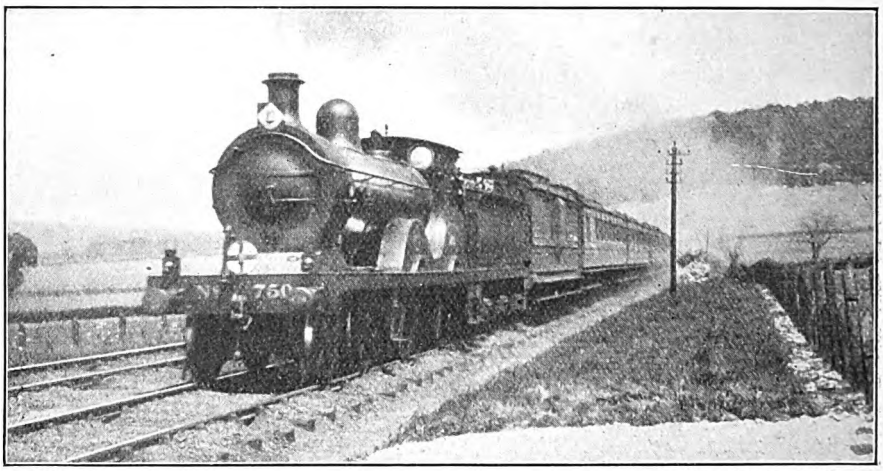
One of the new Borsig engines working a local train when first placed in service.

Digitized by Google

it is rarely that a higher rate than 63 to 65 miles per hour is obtained with these North Eastern engines.

A diameter of from 6 ft. 6 in. to 6 ft. 9 in. may be taken to represent the popular average for the driving wheels of express locomotives in this country, and engines so equipped may be relied on for all classes of passenger service, whether hauling heavy loads over moderately graded roads, maintaining high speeds with medium loads, negotiating heavy gradients, or a combination of all three. As we have seen, however, the provision of smaller wheels to meet special cases, either of loading or grading, evidently does not preclude the possibility of high speeds where necessary, which means that engines thus designed for special purposes need not be limited to one particular class of service, but may be made generally useful. It is not to be expected that the provision of superheaters would affect such a dimension as the diameter of driving wheels, and the tables in this respect show but little modification of the original table for non-superheater engines, published in the March, 1912, issue of the RAILWAY MAGAZINE. For the sake of economy in space, details of working pressure, in which we find very considerable modification, are incorporated in the same tables, so I will leave the reproduction of the tables and consideration of the latter subject over until the October number. Meanwhile it is quite time to turn to performance, and I wish to employ the remainder of the space available by describing the runs previously mentioned with engines having driving wheels of comparatively small diameter.

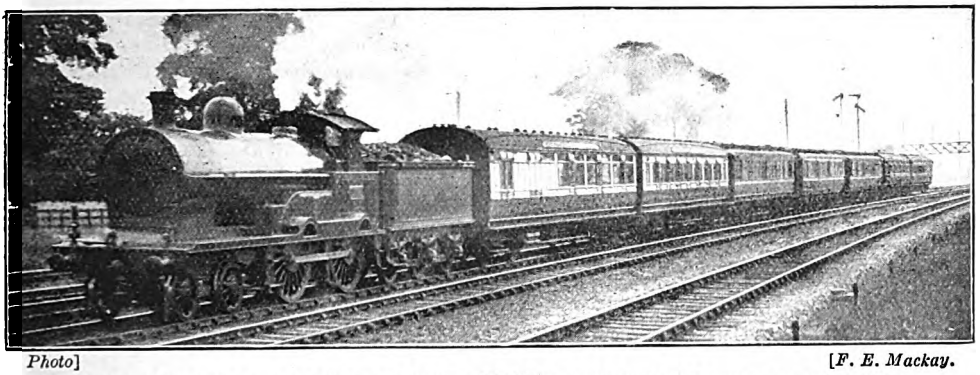
In the first intance I have to refer to an extraordinary experience with a 4-4-0 engine of the G1, or "Waterbury" type, on the North Eastern Railway. The train was one of the 60-min. summer expresses from Bridlington to York—the 6.45 p.m. *ex*-Bridlington—and the load two 8-wheelers, one 6-wheeler, and two loaded 4-wheelers, or not more than about 90 tons in all. No. 521 was the engine concerned. A sluggish start was made, and a signal check at Nafferton caused the initial 11½ miles to Driffield to take 16¾ min. After the usual severe check at Driffield the ascent of the Wolds was poor, no less than 16¾ min. being taken from Driffield to Enthorpe, 10 miles—a feeble showing uphill for an engine with 5 ft. 6 in. wheels. So the 25¼ miles from Bridlington to Market Weighton had taken 38 min., leaving 22 min. for the last 22¼ level miles to York. Instead of accelerating from Driffield, however, the speed fell steadily until near Pocklington we were not doing more than 30 miles per hour, although it was evident from the thick smoke issuing from the chimney and a liberal shower of cinders on the carriage roof that the engine was being stoked heavily. Then followed an astounding acceleration, speed rising, in the course of 4 miles, to no less than 69·2 miles per hour. This was sustained for a short distance, and the rate then fell to 60 miles per hour, although shortly afterwards—and



Photo] [*E. A. Gurney-Smith.*

11.5 A.M. CHARING CROSS, MAIDSTONE AND FOLKESTONE EXPRESS PASSING EYNSFORD.
4-4-0 locomotive No. 750.

Digitized by Google



Photo] [*F. E. Mackay.*

LONDON AND NORTH WESTERN RAILWAY: 11.50 P.M. LONDON-BIRMINGHAM TWO HOUR EXPRESS.

4-4-0 Superheater locomotive No. 1138 *William Froude.*

all the time on a level track—it rose to no less than 71·4 miles per hour, a rate of which I should never have dreamed the engine capable. So the 10½ miles from Market Weighton to Fangfoss took 13 min. 35 sec., but the 9¼ miles thence to Earswick only 8½ min.! Finally we reached York, 47½ miles from Bridlington, in 64 min., or 63 min. net (allowing for Nafferton check). I have never yet fathomed the mystery of this run, and a "tight" connection at York left me no time in which to confer with the driver on the subject.

My Scarborough correspondent, to whom I am indebted for much information on North Eastern matters, has also furnished me with several instances of the running of engines of the G1 type in his own neighbourhood. In one case No. 223 was attached to the 4.50 p.m. express *ex*-Hull, which is unique in that it is the only regular train to pass Bridlington without stoppage, the first call being Filey, 44¼ miles from Hull. The load was one of four 8-wheelers, or approximately 105 tons. At the start the engine gained steadily on schedule time, passing Beverley, 8¼ miles, in 11 min. 25 sec., Driffield, 19½ miles, in 24½ min., and Bridlington, 30⅞ miles, in 37 min. 50 sec., against booked times of 12, 25 and 40 min. respectively. Between Beverley and Driffield a speed of 54·2 miles per hour was reached, and between Driffield and Bridlington one of 56·9 miles per hour, a slack being made at Driffield as usual, together with a severe 20 miles per hour reduction at Bridlington. After Bridlington, however, the work was very poor—again just where the engine might be expected to do well—the 5¾-miles' ascent of Flamborough bank taking no less than 11 min. 50 sec., with a minimum speed of 27 miles per hour! The average grade varies from 1 in 130 to 1 in 90. Beyond the summit a speed of 58·4 miles per hour was attained, making the total time from Hull to Filey one of 59 min. 10 sec., or 70 sec. in excess of schedule. This was therefore a poor finish to a run which had opened quite well.

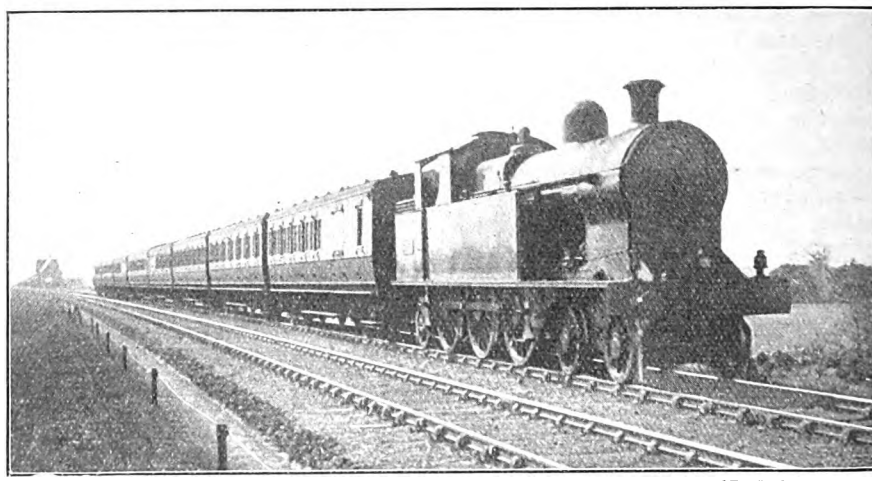
Another record was secured by my friend on the 6.3 p.m. express from York to Scarborough, which has figured several times in these columns. The engine in this case was No. 676, and the load five 8-wheelers, or 130 tons. The road is virtually level, the only hindrance to fast running being the 5 miles of sharply curved line in the neighbourhood of Castle Howard, and the curves at Seamer, over all of which a 45 m.p.h. limit is enforced, while it is customary also to "ease" the speed through Malton. On this run, Haxby, 4¼ miles, was passed in 7 min., and an average speed of from 52-53 miles per hour was maintained thence to Barton Hill, this 7¼ miles' stretch taking 8 min. 10 sec. The speed was not reduced in quite so marked a degree as usual round the Castle Howard curves, and the next 6⅞ miles to Huttons Ambo were therefore covered in 7¾ min.; Malton, 21⅓ miles, was passed in 26 min. 10 sec. from the start. A good speed, averaging mostly about 55 miles per hour, was maintained on to Scarborough, the 4½ miles from Malton to Rillington taking 5 min. 10 sec.; the 8⅞ miles thence to Ganton 9 min. 50 sec.; and the last 7⅝ miles into Scarborough 8 min. 50 sec. The total time was thus exactly 50 min., as booked, and the work for so small an engine was quite creditable. In comparison with this the effort of No. 925—a small 2-4-0 engine of class 901,

Digitized by Google

which type has always had the best of reputations for smart running—furnishes interesting reading. The load was identical. Although with 7 ft. in place of 5 ft. 6 in. driving wheels, the start was much smarter, Haxby being passed in 6¼ min. (at 56·5 miles per hour), and Barton Hill, 11½ miles, in 14 min. On the curves the speed was reduced to the correct figure, the Barton Hill-Huttons Ambo stretch taking 8 min. 13 sec., so that the total time to Malton was 25 min. 40 sec., or only ½ min. quicker than that of the preceding run. Onwards to Scarborough, however, the running was very fine, speed rising to 60·8 miles per hour at Rillington, 64·3 at Knapton, and 66·1 near Weaverthorpe. From Malton to Rillington took 4 min. 57 sec.; from Rillington to Ganton 8 min. 31 sec.; and from Ganton to Scarborough, with a slow finish, 9 min. 37 sec.—an aggregate of 48¾ min. from York. With the same speed on the curves as on the preceding journey, the trip would have been completed in 47 min.

With such a comparison as this it seems really regrettable that it is the class G1 that is now receiving the superheater equipment, while the engines of class 901 are being scrapped. Of course the former locomotives are more suitably arranged for superheating, and those of the engines now superheater-fitted are reported to be doing very well; but I, for one, shall greatly miss the smart little 2-4-0 "Fletcher" engines, which have always been responsible for such consistently excellent work. In further comparison with these runs, I give two of my correspondent's runs on the same train, one with a large 4-4-0 engine of class R, and the other with a superheater-fitted engine of the same type. In the first instance, with No. 725, and four 8-wheelers, or 105 tons, Haxby was passed in 6 min. 37 sec., and Barton Hill in 14¼ min.; the maximum intermediate speed was 60·8 miles per hour, but an acceleration to 63·4 was registered before slacking beyond Barton Hill for the curves, on which speed was reduced to the required figure. Malton was passed in 25 min. 10 sec., and at a greatly reduced speed of 40 miles per hour. Speed ruled high beyond Rillington, a rate of 70·3 miles per hour being sustained for some distance in the neighbourhood of Heslerton. So, although 5 min. 20 sec. were spent between Malton and Rillington, the time for the 8⅞ miles from Rillington to Ganton was only 8 min. 16 sec. A signal check at Seamer made the time from York to Scarborough 48¼ min. in all, but the net time did not exceed 47 min.

On the other run the engine was No. 2109, superheater, and the load only four 8-wheelers, or 105 tons. Haxby was passed in 6 min. 20 sec. and speed at once rose to 62·5 miles per hour, Barton Hill being passed in 13 min. 36 sec. Beyond Barton Hill a further acceleration to 67·1 miles per hour was registered, although on the curves the rate fell to 42·8: between Huttons Ambo and Malton the speed reached 61·6 miles per hour, but with extraordinary caution the driver slacked to 30 miles per hour through Malton station. Malton was passed in 24 min. 10 sec. from York, and



Photo] [*R. J. Osborne.*

LONDON AND NORTH WESTERN RAILWAY.

Up express taken from Birmingham to Rugby by 4-6-2 tank locomotive No. 217.

Digitized by Google

Photo] [*E. G. Hallett.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.
8.25 a.m. Victoria-Brighton train.
4-4-0 locomotive No. 54 *Princess Royal.*

the subsequent 4½ miles to Rillington occupied 5 min. 29 sec. An excellent speed was maintained from Rillington to Ganton, this 8⅞ miles only occupying 8 min. 31 sec., with a top speed of 69·2 miles per hour, and the final 7⅝ miles into Scarborough were then covered in 8 min. 32 sec. The total time from York to Scarborough was thus 46 min. 32 sec., but a more normal speed round the curves and at Malton might have easily reduced the aggregate to 45 min. Recently I timed a still faster run, with the same train and load, behind one of the large 4-4-0 engines of class R1—No. 1244—also superheater-equipped. Haxby, 4¼ miles from York, was passed in the "record" time of 6 min. 10 sec. and the speed at Strensall had risen to 65·2 miles per hour, so that Barton Hill, 11½ miles out, was passed in 13 min. 5 sec. Beyond Barton Hill we touched 69·2 miles per hour, but the driver's caution on the curves was almost painfully severe, speed falling finally to 36 miles per hour. Indeed, the 3⅜ miles from Kirkham Abbey to Huttons Ambo took 5 min. 5 sec. in all! Consequently our time to Malton was not exceptional, as it totalled 24¾ min. from York. Gaining speed again rapidly, Rillington was passed in a further 5 min. at 60 miles per hour, and a rate varying from 68·1 to 70·3 miles per hour was maintained beyond throughout to Ganton, the 8⅞ miles taking only 8 min. 5 sec. Seamer curves were rounded very slowly, the final time from Ganton into Scarborough being 9 min. 25 sec. Although the journey time from York to Scarborough was thus 47¼ min., with the speed of the first journey round the various curves, a time of 45 or even 44 min. from York could have been easily achieved, without any higher maximum speeds than those recorded. But of course the engine merely played with so trifling a load.

I have now to describe the promised North Staffordshire run behind the 4-4-0 superheater tender engine No. 38. The load of the 12.10 noon train from Manchester (London Road) was in this instance ten 8-wheeled corridor coaches, and a 12-wheeled luncheon car, or 350 tons in all. We started well from Stockport, the 2½ miles out to Cheadle Hulme occupying only 4 min. 40 sec., but here a more severe slack than usual was made. Thence the 3¾ miles up to Poynton, mostly at 1 in 191-192, occupied 5 min. and the 6½ miles on to Macclesfield 9 min. 20 sec., the time for this sharply adverse 11¾ miles' stretch being thus 19 min. or a minute in excess of schedule time. Starting again from Macclesfield, with a bank engine assisting in rear, the 2½ miles ascent at 1 in 101 to Macclesfield Moss Box occupied 5½ min. On the descent to North Rode we touched a top speed of 63·8 miles per hour, the 5¾ miles from the Moss Box to Congleton taking 6½ min., but the driver then eased off, the 5¾ miles from Congleton to Harecastle taking 6 min. 25 sec., and the final 6 miles into Stoke, with a very cautious passage of Harecastle Tunnel, 8 min. 35 sec. The 20 miles from Macclesfield to Stoke thus occupied 26 min. 55 sec.—almost exactly as booked—and although the performance did not come up to the level of my first trip with the superheater 4-4-2 tank No. 55, it was nevertheless quite good with so heavy a load as 350 tons.

A few days later, however, I timed a run with No. 14—one of the 4-4-2 superheater tanks—which not only eclipsed the run last mentioned, but also the two detailed in the August article behind No. 55, of the same type. The load was again very heavy, three extra eight-wheelers being run, giving a total of eleven in addition to the restaurant car. This brought the aggregate load, with passengers and luggage, to no less than 380 tons, as the train was composed almost entirely of the latest 57 ft. vehicles. On starting from Stockport the engine slipped rather badly, and so

Digitized by Google

took 5 min. 10 sec. to pass Cheadle Hulme, but the recovery from the slack up the adverse grade to Poynton was very fine, the speed reaching 40·5 miles per hour, increased on the short level stretch beyond to exactly 50. On the final steep ascent to Macclesfield the minimum speed recorded was as high as 47·4 miles per hour. The times were, therefore, from Cheadle Hulme to Poynton 4¾ min., and from Poynton to Macclesfield 8 min. 25 sec., giving a total from Stockport of 18 min. 20 sec.; the slight excess on schedule was more than accounted for by the slipping at the start. Banked in rear as usual, we ran from Hibel Road station to Macclesfield Moss Box in 5 min. 35 sec., and then began a fine speed exhibition. At North Rode viaduct we were doing 63·8 miles per hour, and the mile-a-minute ran continued beyond Congleton, the lowest speed recorded on the succeeding ascent to Harecastle being 52·3 miles per hour. The time from the Moss Box to Congleton was thus 6¼ min., and from Congleton to Harecastle 6 min. 5 sec. A cautious passage of the tunnel and a slow run into Stoke increased the time from Harecastle to Stoke to 8¼ min., but even then the total time from Macclesfield to Stoke was only 36 min. 10 sec., and we had thus gained 50 sec. on the 27 min. booking for this 20 miles. I consider this one of the finest runs it has ever been my good fortune to record behind a tank locomotive, the load being so exceptional for a engine of this type.

As previously mentioned, I am indebted to a correspondent for details of some runs on the Paisley and Ayr section of the Glasgow and South Western Railway, which show considerable improvement on those described in my July article. On one of the same trains—the 1.50 p.m. *ex*-Ayr—my friend had the same engine—No. 136, of the new large 6 ft. 4-4-0 type—and an almost identical load of 220 tons. The start was a little better, Prestwick, 3¼ miles, being passed in 6 min.; the train then took the loop line at Troon, passing the latter town, 6½ miles from Ayr, in 10 min. 35 sec. This divergence adds ¼ mile to the distance and entails a severe slack at Barassie Junction, where the main line is rejoined. Moreover, a further slack was encountered near Irvine, so that the 15 miles from Ayr to Kilwinning had taken 22 min. An improvement now set in, however; the 15¾ miles from Kilwinning to Johnstone occupied only 19½ min. and the 3¼ miles thence into Paisley 4 min. 5 sec. The total time for the 34 miles from Ayr to Paisley was 54 min. 35 sec., but, allowing for the diversion and the checks, the net time did not exceed 43 min. In the reverse direction, also, my correspondent was more fortunate than I was with the 12.30 p.m. *ex*-St. Enoch, and, strange to relate, the same 4-6-0 engine, No. 386. In his case the load was less, only totally 150 tons with passengers and luggage. On leaving Paisley, Johnstone, 3¼ miles, was passed in 6 min. 5 sec., and Lochside, 8¾ miles, in 12 min. 50 sec.; after this the speed was quite good, the 6¾ miles from Lochside to Dalry taking 7 min. 10 sec.; the 7 miles thence to Irvine 6 min. 40 sec.; and the 8 miles from Irvine to Prestwick 8 min. 20 sec.; while the last 3¼ miles into Ayr consumed 4¼ min. The 17 miles from Dalry to Newton were covered in exactly 17 min., and the total time for the 33¾ miles from Paisley to Ayr was only 39¼ min., or 1¾ min. under schedule time. This, therefore, was quite a creditable time, being over 2 min. less than that which I recorded.

Digitized by Google

The Metamorphosis of Heysham.

By R. LENDREM-AINSLIE.

ON 7th August, 1896, Royal Assent was given to an Act of Parliament "to empower the Midland Railway Company to construct a Harbour at Heysham in Morecambe Bay," and towards the end of 1897 the Midland Company commenced the construction of a harbour for its new line of steamers to Ireland and the Isle of Man.

A century since Heysham was, so it is stated, "a watering place of fashion," when Morecambe was as yet unknown to fame, though visitors were more select than numerous. Be this as it may, Heysham to-day is a bustling little colony where, but a few short years ago, its rocks and sandy dunes echoed only to the call of the gull and curlew. The contour of the Lancashire coast at this point has undergone a remarkable change, many old landmarks having disappeared and a large tract of foreshore reclaimed from the sea, and now, with its magnificent harbour, designed, executed and equipped to the smallest detail with an eye to the necessities of modern travel, Heysham has become one of the principal ports for Irish and Manx traffic.

The harbour opens out into what is locally known as Heysham Lake—a deep broad channel of water affording direct access to the Irish Sea. After negotiating this dredged channel, which is about 900 ft. long, vessels proceed at full speed, and are independent of the state of the tide in either entering or leaving. The channel is marked by seven buoys, four on one side and three on the other. Six of these are lighted by Pintch's gas, and will burn, if necessary, for four months without being re-charged.

In September, 1914, Heysham will complete the first decanal period of its existence, and before dealing with the traffic methods in force, a short outline of the general works may not be uninteresting to readers. Two huge breakwaters starting from points known as Red Nab, on the Fleetwood or south side, and Near Naze, on the Morecambe or north side, stretch out their arms into the sea and gradually converge and terminate with "roundheads," 300 ft. apart, which form the mouth of the harbour. The walls of the breakwater are one and a half miles apart, while a distance of two and a half miles separates the extreme ends of the embankments.

Of the promontory made by the breakwater, only a comparatively small portion has been used for the present scheme—that taken for the tidal harbour, passenger and goods stations, sidings, offices and works. On the south a large area of low-lying ground is being held in reserve for graving docks, wet docks, timber ponds, etc. This huge area is cut off from the completed harbour by a heavy brickwork dam, which opens out into the harbour basin near the end of the South Quay, so that should future extensions become necessary, complete protection from the sea is ready provided during operations. The area of water in the present harbour is 36 acres, with a minimum depth of 17 ft. at low water, and up to 43 ft., or even more, at high water. This large variation is explained by the fact that the rise and fall of the tides in Morecambe Bay is very considerable. The South, or principal, Quay measures a third of a mile from end to end, and can readily berth four or five steamers. It is built entirely of mass concrete, topped with granite copings from Shap, and faced with heavy timbers or booms of Karri wood from West Australian forests, forming the landing stage, constructed in three tiers, all connected by subways, steps and lifts with the adjoining passenger station. On the north side of the harbour the quay at present erected is much shorter than the south quay, and measures 900 ft. only. This quay is used principally by trading and coastal steamers carrying pig-iron, iron ore and mineral and timber traffic, and is also frequently used for berthage for the Belfast and Isle of Man steamers on "spare" duty, while further along the same side a small wharf or quay has been erected to deal with fish traffic.

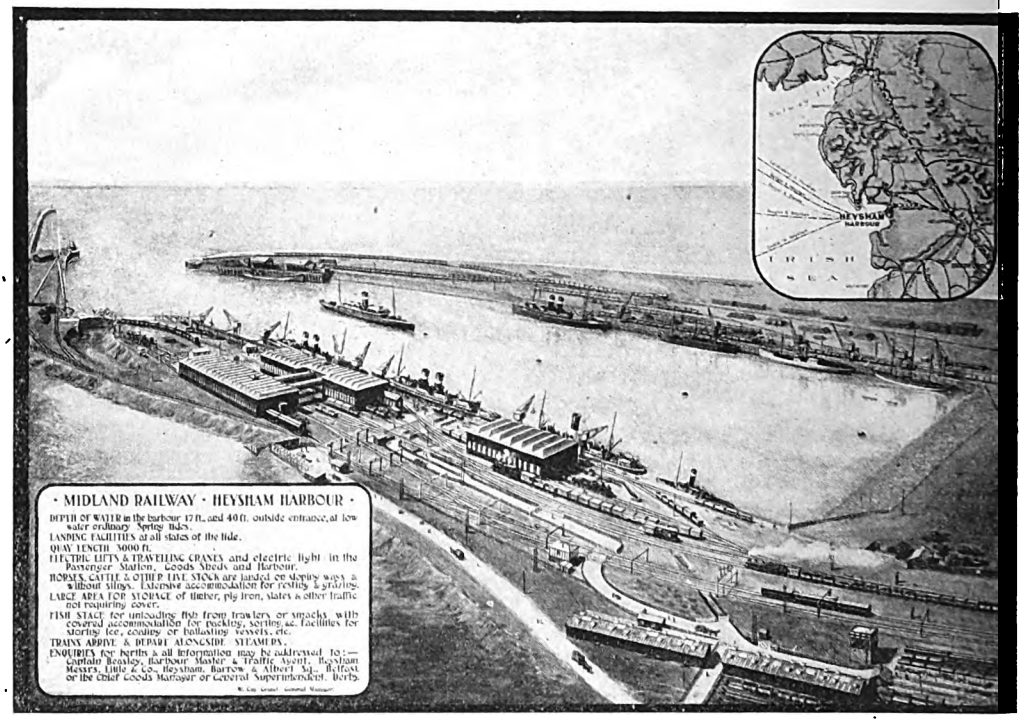
Should traffic exigencies ever warrant it, the North Quay can be extended along the north walls of the harbour and joined to the fish quay just inside the "roundhead" of the north breakwater: this would provide a second magnificent quay similar in length to the South Quay. Between the North Quay and the North Breakwater the inter

Digitized by Google

vening space is laid out with sidings, and also ample room is reserved for stacking large quantities of timber, pig-iron, etc. On the North breakwater an anemometer tower has been erected where wind records are preserved and barometrical readings taken. On the ground lying between the South breakwater and the South Quay a wireless telegraph station has been erected, and communication maintained with the Company's steamers on the Irish and Manx services.

The passenger station adjoins the South Quay, with commodious and well equipped premises, and has been so erected that it can

driven from the ships up sloping subways to the lairage or paddocks, model structures of their kind. To the east of the harbour meadow land has been retained to enable importers to graze their cattle for a day or two after the sea voyage before entrainment for the markets, thus increasing the saleable value of the stock. Lairage accommodation has been provided for the reception and shelter of cattle, sheep and pigs during the time they are detained in quarantine in accordance with the Board of Agriculture regulations. The building is close to the quay, and is fitted up with 22 pens, which afford room for approximately 1,000


· MIDLAND RAILWAY · HEYSHAM HARBOUR ·
DEPTH OF WATER in the harbour 17 ft. and 40 ft. outside entrance, at low water ordinary Spring tides.
LANDING FACILITIES at all states of the tide.
QUAY LENGTH 5000 ft.
ELECTRIC LIFTS & TRAVELLING CRANES and electric light in the Passenger Station, Goods Sheds and Harbour.
HORSES, CATTLE & OTHER LIVE STOCK are landed on sloping ways & without slings. Extensive accommodation for resting & grazing.
LARGE AREA FOR STORAGE of timber, pig iron, slates & other traffic not requiring cover.
FISH STAGE for unloading fish from trawlers or smacks with covered accommodation for packing, sorting &c. Facilities for storing ice, coaling or ballasting vessels, etc.
TRAINS ARRIVE & DEPART ALONGSIDE STEAMERS.
ENQUIRIES for berths & all information may be addressed to:— Captain Beasley, Harbour Master & Traffic Agent, Heysham Messrs. Little & Co., Heysham, Barrow & Albert Sq., Belfast or the Chief Goods Manager or General Superintendent, Derby.
HEYSHAM HARBOUR
IRISH SEA

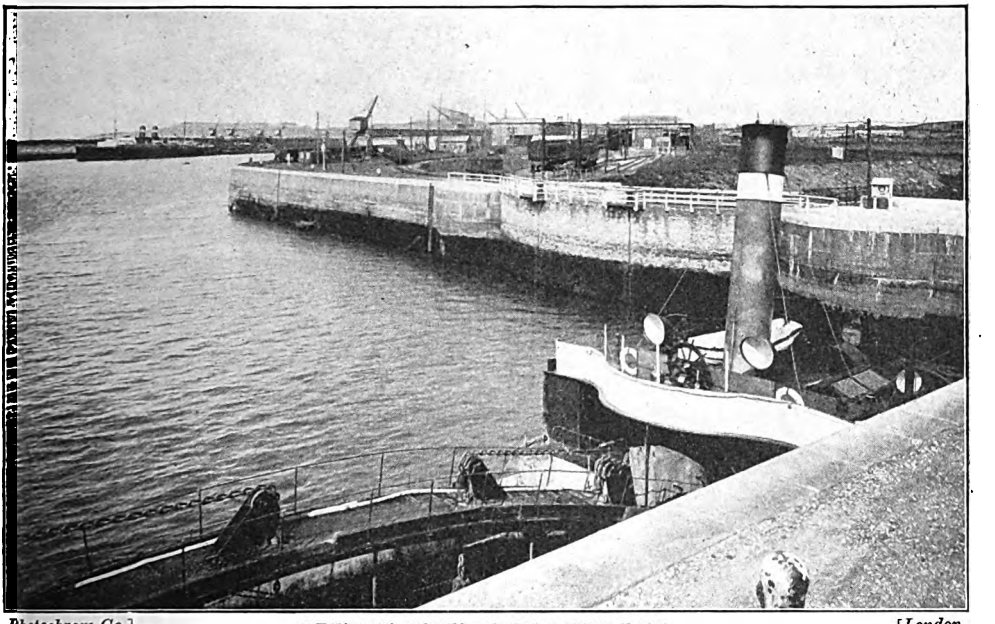
GENERAL VIEW OF HEYSHAM HARBOUR.

be easily replaced by a larger and more pretentious building when the passenger traffic of the port warrants a reconstruction. It is of the "island" type, though a third platform outside the station buildings was added a few years ago to deal with special passenger and relief trains in connections with the Manx steamers.

For the accommodation of a large goods traffic every facility has been provided, and excellent arrangements made for dealing with a large import trade in Irish horses, cattle, sheep, pigs, geese, etc., which are

head of livestock and all the necessary requisites for feeding and watering. The arrangements permit of the animals walking off the steamers to the lairage yard and loading dock by means of subways and bridge. A slaughter house with all the latest improvements forms one of the adjuncts to the lairages, and is fully equipped for dealing with a large number of animals. The lairages are so arranged that the animals after rest, can be taken direct to the loading dock for rail despatch, and stable accommodation for 40 horses is also

Digitized by Google



Photochrom Co. HEYSHAM DOCKS, FROM SOUTH-EAST. [*London.*

available, while at the time of writing huge sheds where facilities for sheep dipping, etc. will be provided are being erected to enable the Company to deal with a larger sheep traffic under the stringent regulations of the Board of Agriculture.

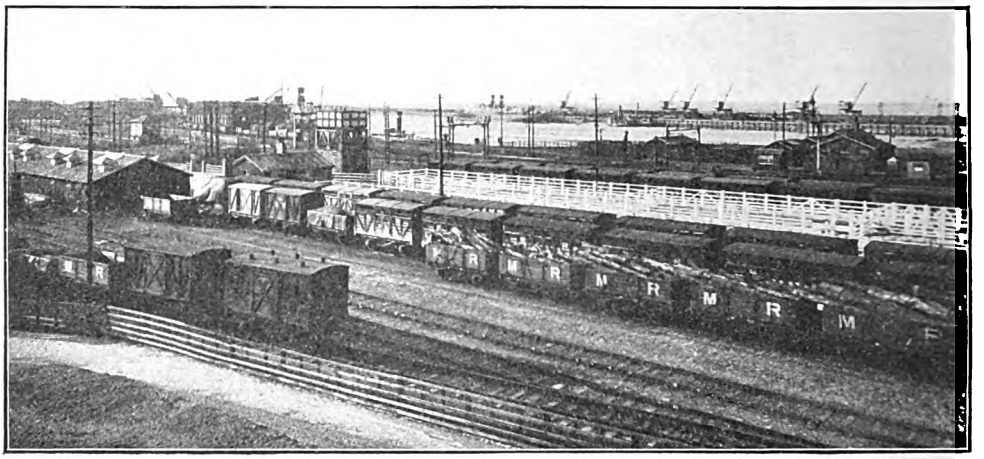
Electricity is employed throughout the station, harbour and works, both for lighting and for operating the capstans, cranes, machinery, etc., as also the electrified portion of the line from Heysham to Lancaster and Morecambe.

Such is the brief outline of the harbour of Heysham, upon which a sum of over three million pounds has been spent by the Midland Railway. The more one examines it, the more is one impressed with the fact that nothing appears to have been left undone; the magnitude of the work, the solidity of its construction, the completeness of its design, and the spacious provision for all possible future extensions, impress one deeply with a sense of the brilliant conception and tireless energy with which the Midland Company has raised Heysham into a first class port. Of the strenuous and costly battle with the sands, which for some time necessitated the constant use of four dredgers to keep the harbour from silting up, nothing more need be said here, than that the construction of the new jetty off the south breakwater has been entirely successful in its aim to create a scour past the harbour entrance and so remedy this evil.

Passing now to the actual methods of traffic working, it may be noted that the Midland Company now possesses in all some thirteen steamers (not counting the three steamers on the Larne and Stranraer route of which the Midland are joint owners to the extents of two fifths). Six of these are in use between Tilbury and Gravesend, one is stationed at Barrow-in-Furness and works between that port and Belfast, and six are used for the Heysham services, plying between that port and Belfast all the year round, and to Douglas and Fleetwood in addition during the summer.

	Speed knots.	Gross tonnage.	Passenger accommodation.	Length feet.	Breadth feet.
Manxman	23	2,100	1,600	334	43
Londonderry	22·3	2,100	1,200	330	42
Antrim	21·9	2,000	1,200	330	42
Donegal	21·4	2,000	1,200	331	42
Duchess of Devonshire ..	19	1,265	—	300	35
Wyvern	(Tender & Tug)				

Digitized by Google



HEYSHAM HARBOUR.

The Midland Company's steamers stationed at Heysham during the summer are as follows: The *Manxman* and *Londonderry* are turbine steamers, while the *Antrim*, *Donegal* and *Duchess of Devonshire* are twin-screw steamers. All are fitted with wireless telegraph apparatus with a normal range of fully 150 miles.

During the winter the *Manxman* and *Duchess of Devonshire* are laid up at Barrow, and the steamer service from Heysham is as follows:—At 9 p.m. daily a Laird Line steamer departs for Dublin (North Wall)—a distance of 138 statute miles or 119·8 knots—where it is due about 7 a.m. next morning. This steamer is in connection with the 5.40 p.m. train from Leeds, due at 8.20, which calls at all stations from Saltaire to Heysham with the exception of Steeton and Cononley. A similar service leaves Dublin each night at 7.30 and is due to connect at Heysham with the 7.30 a.m. Yorkshire express *viâ* Morecambe. At 12.5 midnight a Midland steamer leaves every night for Belfast (Donegal Quay) where it is due at 6.20 a.m., Irish time. As the distance to Belfast is exactly the same as to Dublin the superior speed of the Midland steamer is at once apparent. The Belfast boat is in connection with the 6.0 p.m. boat train from St. Pancras, due at Heysham at 11.52 p.m., and at Belfast connects with the 8.0 a.m. Midland Restaurant Car express to Portrush and Londonderry. A corresponding steamer leaves Belfast every night at 9.30 (Irish time) and arrives at Heysham at 5.40 a.m. connecting with the 6.15 a.m. boat express to St. Pancras.

Three Midland steamers are reserved for the Heysham-Belfast services, the *Londonderry*, *Antrim* and *Donegal*, each running a month and laying up 15 days.

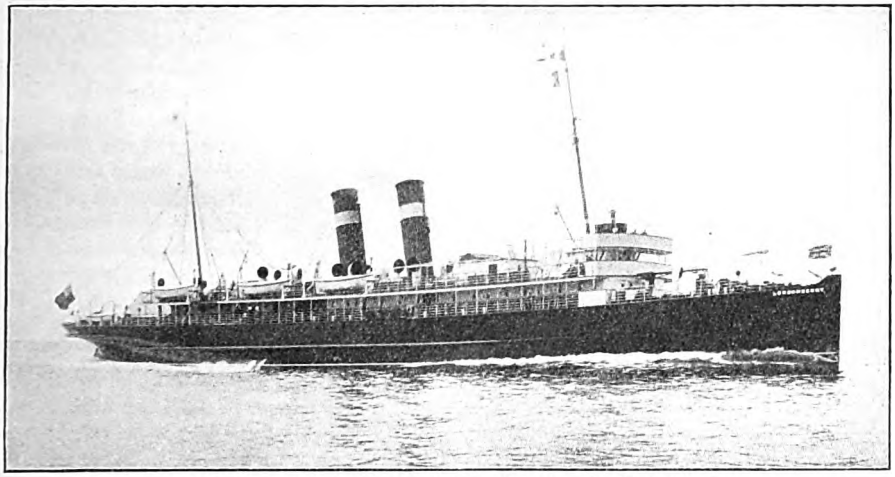
Every Wednesday and Saturday an additional Laird Line steamer leaves Heysham at midnight for Londonderry direct, after the arrival of the 6.0 p.m. boat express from St. Pancras, while a corresponding Laird Line steamer leaves Londonderry every Tuesday and Friday at 3.30 p.m. connecting at Heysham the following morning with the 7.30 Yorkshire express. The distance from Heysham to Londonderry is 220½ statute miles or about 191·5 knots. The Midland Company's passenger tender and tug *Wyvern* is, during the winter months, employed on various duties at Heysham, such as assisting the Belfast steamers in the Heysham Lake channel in foggy weather, towing, and "gassing" the harbour buoys, etc.

Turning now to the summer services, it may be noted that the Belfast, Dublin and Londonderry sailings remain unaltered, and therefore need not be further referred to. On 1st July, the *Wyvern* becomes a full-fledged pleasure steamer. Every weekday from 1st July to 22nd September, cheap day excursion tickets are issued from Lancaster, Morecambe and Heysham to Fleetwood and Blackpool by the *Wyvern*, which leaves Heysham harbour at 9.35 a.m. and arrives at Fleetwood at 10.35 a.m. connecting with the 10.42 a.m. train to Blackpool (Talbot Road). The steamer returns from Fleetwood to Heysham and makes a second trip to Fleetwood at

Digitized by Google

5.0 p.m., leaving there at 6.15 after the arrival of the 5.40 train from Blackpool (Talbot Road). The return fares for this excursion are remarkably cheap, being only one shilling and sixpence to Fleetwood and two shillings to Blackpool from Heysham, and sixpence more from Lancaster or Morecambe. Passengers on the morning run to Fleetwood or Blackpool, return from Fleetwood at 6.15 p.m. The 5 o'clock evening run from Heysham also carries passengers for a two hours evening cruise to Fleetwood without landing, the fare being ninepence (one shilling from Morecambe).

These excursions from Lancaster, Morecambe and Heysham to Fleetwood and Blackpool have become exceedingly popular, notwithstanding the smallness of the steamer and the necessity for the intimation that



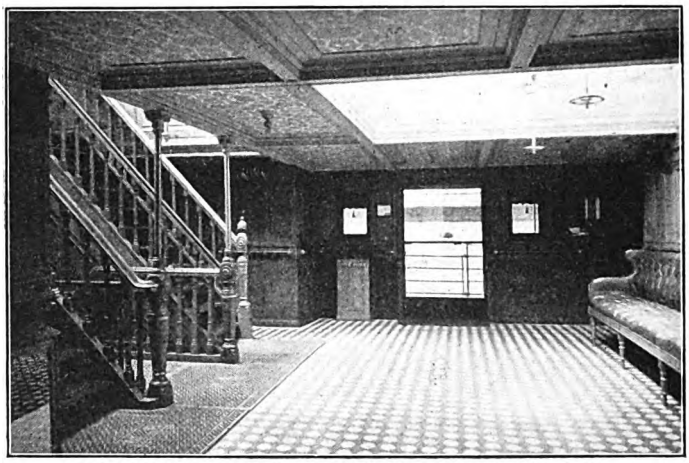
MIDLAND RAILWAY TURBINE STEAMER: *Londonderry.*

"The number of tickets issued for the steamer being strictly limited, passengers should take their tickets early to prevent disappointment."

The suggestion may be advanced that the Belfast "spare" boat, which is lying idle at Heysham during the week—except on Saturdays when it is engaged in Douglas sailings—could be utilised to sail from Heysham to Llandudno and back. Such a service would tap the cream of the Lancashire coast resorts, and link up with the Queen of Welsh Resorts, Llandudno, and in doing such would accomplish something never before attempted. On Saturdays such a service would be impracticable, as the Belfast "spare" boat is required in the Douglas service during the month of August.

Turning now to the Manx summer services. From 1st July to 8th September the *Duchess of Devonshire* is due to leave Heysham at 10.0 a.m. and reach Douglas at 1.15 p.m., a distance of 66 miles or 57·3 knots, returning from Douglas at 4.0 p.m. and arriving Heysham at 7.30 p.m. Express trains from the northern and central sections of the Midland Railway run both ways in connection with this service. From 4th July to 20th September inclusive, the *Manxman* takes up her station on the Douglas afternoon service. Leaving Heysham at 3.0 p.m. she is due to arrive at the Victoria Pier at Douglas at 5.45 p.m. Lying overnight at Douglas, the *Manxman* leaves the following morning at 9.30 and is allowed $2\frac{3}{4}$ hours to reach Heysham. The service by the *Manxman* is regarded as the principal service by the Midland route and is becoming increasingly popular. Express trains from London, Birmingham, Yorkshire and all parts of the Midland system, are given in connection therewith. Commencing in July, 1913, through carriages were also run between Harrogate and Heysham *viâ* Ilkley and Skipton, in connection with the sailings of the *Manxman*, connection being made at Harrogate with a through express from Newcastle-on-Tyne and the North Eastern District. It will thus be noticed that during the season, two Midland steamers, the *Duchess of Devonshire* and the *Manxman*, are employed to work the Douglas service, the former leaving Heysham in the morning and returning there at night, and the latter starting from Douglas in the morning and returning there at night.

Digitized by Google



SALOON ENTRANCE: TURBINE STEAMER *Londonderry.*

On Saturdays during the height of the season the services are considerably augmented, and the working is somewhat intricate. On Saturdays 2nd to 16th August, of last summer, an additional morning steamer left Heysham at 11.30 and returned from Douglas about 3 o'clock the same afternoon. These trips were worked by the steamer from Belfast arriving at Heysham on Saturday mornings at 5.40, which was hurriedly discharged and prepared to leave for Douglas at 11.30 a.m. On Saturdays 9th to 23rd August an early relief sailing was given from Douglas at 8.30 a.m. in advance of the regular 9.30 a.m. boat. This relief sailing was performed by the *Manxman,* while the *Manxman's* regular service at 9.30 a.m. was taken up by the Belfast spare boat which had been laid up at Heysham all the week, and which left Heysham "light" in the early hours of Saturday morning for Douglas to take up the *Manxman's* 9.30 run to Heysham. On Saturdays 5th July to 6th September the *Duchess of Devonshire* (which works the 10.0 a.m. *ex*-Heysham and the 4.0 p.m. *ex*-Douglas) made an additional trip to Douglas leaving Heysham at 12.5 midnight, in connection with the 6.0 p.m. boat express from St. Pancras, and was due at Douglas at 4.0 a.m., passengers being allowed to remain on board till about 7.0 a.m., if berthed alongside. The *Duchess of Devonshire* remained at Douglas over Sunday and left for Heysham at 11.30 on Sunday night, arriving at Heysham at 3.0 a.m. on Monday morning, a connecting express leaving at 3.30 a.m. for Leeds and Bradford.

On Saturday, 9th August, 1913, the writer spent the day at Heysham Harbour watching the traffic. At 9.35 a.m. the *Wyvern* left crowded with passengers for Fleetwood and Blackpool. At 10.0 a.m. the *Duchess of Devonshire* got away for Douglas, with her full complement of passengers. At 11.30 a.m. the *Antrim,* which had arrived from Belfast at 5.40 that morning, left for Douglas with a large number of passengers. The next event was the arrival, about 12 noon, of the *Manxman,* with crowded decks, which worked the special 8.30 a.m. relief run from Douglas, followed by the arrival, shortly after half past twelve, of the *Londonderry*—with over 1,100 passengers on board—which had taken the 9.30 a.m. run from Douglas.

After coaling at Heysham the *Manxman* left again for Douglas at 3.0 p.m., crowded to her utmost capacity, and the *Londonderry,* which had also coaled after arriving from Douglas, followed as a relief, returning again from Douglas "light" the same evening. At 5.0 p.m. the *Wyvern*—which had returned from Fleetwood during the forenoon—left again for Fleetwood to bring back the passengers carried by the morning run, and also taking passengers for the evening cruise without landing. Shortly after 7.15 p.m. the *Wyvern* arrived back at Heysham. At 6.30 p.m. the *Antrim,* which left Douglas at 3.0 p.m., arrived with a large number of passengers, and was followed by the *Duchess of Devonshire* which left Douglas at 4.0 p.m. and arrived at Heysham after 7.30 p.m., crowded with return day excursionists.

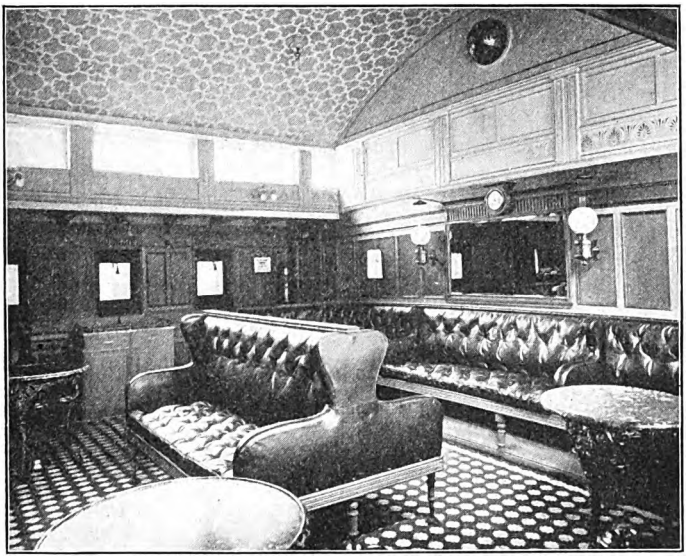
Several special trains had to be run to accommodate the huge numbers landed from the *Antrim* and *Duchess of Devonshire.* At 9.0 p.m. the Laird Company's steamer, carrying a fair number of passengers, left for Dublin after the arrival of the 5.40 p.m. train from Leeds. From 9.0 p.m. till nearly midnight Heysham enjoyed the first period of comparative quietness for the day, broken only by the arrival and departure of one or two Morecambe electric trains. 11.52 p.m. witnessed the arrival of the 6.0 p.m. boat express from St. Pancras, and the platforms and South Quay again became scenes of bustling activity. First to depart was the *Antrim* for Belfast, followed by the *Duchess of Devonshire* for

Digitized by Google

Douglas, and the Laird Line steamer for Londonderry. Both the Belfast and Douglas steamers carried large numbers of passengers.

The departure of these three steamers within a few minutes of each other was carried out with the utmost celerity and despatch and betokened a high degree of organisation admirably carried out by the staff; this closed the business for the day at Heysham, and the writer had only time to make a hurried passage from the quay to the platform to catch the 12.15 a.m. Workmen's train back to Morecambe, where he was staying.

For some considerable time after its opening the amount of traffic, passenger and goods passing through Heysham proved somewhat disappointing, and this fact, coupled with the enormous expense involved in the long fight with the sand, caused the impression to get abroad that the Midland Company regarded Heysham as a white elephant. Taking the latter point first, it has already been noted that the new jetty erected some three or four years ago has been singularly successful in its aim to create a scour past the harbour entrance, and so prevent the tendency towards silting up. In recent years traffic of all kinds has shown a very gratifying increase, and this increase has proved steady and continuous. Last year, indeed, the passenger traffic at Heysham easily eclipsed all previous records, and the Company was called upon to deal with Manx passengers on a scale which severely taxed the capabilities of the new route. On several Saturdays during August, 1913, every available steamer possessed by the Midland Company at Heysham was pressed into service to deal with the huge crowds of holiday makers bound for Douglas, while numerous special trains had to be run in addition to the duplicating and triplicating of the ordinary boat expresses. It is yet early to speak of the 1914 traffic, but so far there is every indication of correspondingly notable increases, and should the passenger traffic continue to expand at this rate the Company will be faced with the immediate necessity of rebuilding and enlarging the passenger station at Heysham.



SMOKE ROOM: TURBINE STEAMER *Londonderry.*

Digitized by Google

From Antofagasta (Chili) to La Paz (Bolivia).

(No. I.)

By S. M. WHITTON.

This article is compiled from a journal prepared by the author for private perusal by relatives at home. The journey was made on his transfer from Antofagasta to La Paz, in the service of the railways concerned. The record thus obtained is, however, worthy of wider publicity, and by arrangement with relatives of the author it has been adapted in the form now presented. Some of the photographs reproduced were taken by Mr. Whitton, others have been lent by the Antofagasta (Chili) and Bolivia Railway and firms who have supplied material.

IN commencing this record, I do not think that a better opening could be made than by a few preliminary words about Antofagasta—the town in which I lived and worked for eighteen months—and the wonderful " mountain " railway, of the staff of which I am a member.

Next to Valparaiso, Antofagasta is the most important town of that rising Republic, Chili. It is also of vital importance to the inland State of Bolivia, of which country it might be aptly described as the " Gateway." Although other means of access have since been opened up, Antofagasta still remains the principal outlet for Bolivia's mineral wealth, and the inlet for by far the greater portion of her imports.

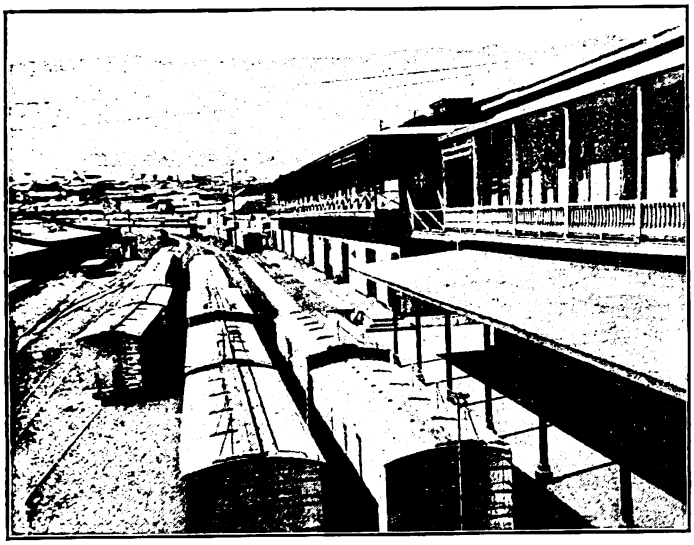
Twenty years ago the ports of Antofagasta and Mejillones were in Bolivian territory, but Chili, recognising the tremendous wealth existing in the huge nitrate fields of the district, annexed the whole of the country round about Antofagasta after their victorious war with Bolivia, and that country has ever since remained without a port. In 1873 the Cia de Salitres y Ferro Carril de Antofagasta obtained a concession from the Bolivian Government to build a line from Antofagasta to their nitrate ground at Salinas. Subsequently, in 1887, the Huanchaca Co. took over the line and obtained a concession for extension to Uyuni and thence to their mining properties of Huanchaca and Pulacayo. In November, 1888, the Huanchaca Co. transferred its concession to the Antofagasta (Chili) and Bolivia Railway Co. and entered into an arrangement under which it obtained a lease of the existing line, as also of the extension to Oruro which was completed in 1892. In 1904 the Antofagasta (Chili) and Bolivia Railway took over the working and have made the railway what it is at present—the most important privately owned line in Chili. From being a quite insignificant affair, it has developed into a prosperous undertaking, and is now running a regular service of elaborate corridor trains, thrice weekly, linking up the capital of Bolivia with the Pacific.

The whole length of the railway, from Antofagasta to Oruro, in Bolivia, has a gauge of only 30 inches, though widening to the metre gauge is contemplated, and yet the coaches are as spacious and comfortable as anything to be found in England. All the " International " trains consist of sleeping and dining cars which are electrically lighted and fitted with every convenience, and are usually drawn by two powerful locomotives, which, in spite of the severe gradients which are encountered, are capable of very considerable speeds, La Paz, which is about 720 miles from the coast by this route, being reached in just under 54 hours.

Considering that the train has to ascend to an altitude of 13,000 ft. within the first sixteen hours, and also taking into consideration the extremely narrow gauge, this is a very creditable performance, though one must see the country to appreciate what it means, as no English railway has such terribly mountainous country to traverse.

A remarkable point about the main line is that, throughout its whole length, there is not a single tunnel, and only one bridge of any importance, which is, however, the second highest in the world, and which will be fully described further on.

Digitized by Google



Photo] [*S. M. Whitton.*

STATION AND OFFICES, ANTOFAGASTA.

A striking instance of the thoughtfulness of the owners of the line is the provision of cylinders of oxygen on the trains running between the coast and Oruro, in order to afford means of relief to passengers who may be overcome by the rarity of the atmosphere at the higher altitudes.

The day of our departure from Antofagasta was what an American would call a "hustle." All day long we had been busy with packing cases and office impedimenta —for the changing of an entire office to a town so many miles away is no light task. The result was that we had little time left to attend to our own personal belongings. At the last minute I was commissioned to rush around after a new typewriter which had been ordered, and, of course, forgotten until the last minute. After seeing this safely into the Special "Equipaje" van attached to the train, I found myself with very little time to get to the other end of the town and fetch my own personal belongings (*i.e.*, two packing cases, three portmanteaux, a cabin trunk and sundry parcels !).

Hastily calling a "coche" and a cart, off I went from the station at terrific speed, with the mule cart bringing up the rear. The house was reached in record time, and for a few minutes there was a tremendous heaving and gasping as the various boxes were hauled into the cart, then hand-shakings and good-byes from the fellows not coming to the station, and a frantic scramble into the "coche" and cart of those who were, then off we went to the station again—down hill all the way —like a couple of fire-engines, both vehicles filled with a yelling horde.

I have since wondered what the good people of Antofagasta thought of our breathless progress down the main street. In that deadly-dull old town, it does not take much to get a demonstration from the English fellows. The shouts of "Viva Chili" and "Viva Bolivia" mixed with lusty "Hurrahs" were deafening, whilst the perilous swaying of the crazy "coche" quite eclipsed anything I have experienced whilst "coming into action" in the old Artillery days.

The station was soon reached, four minutes before the train was due to start, or at 8.36 p.m. Some good friend paid the "cochero," another bestowed a liberal tip on the carter, my baggage was bundled into the "Equipaje" van, and, before I knew where I was, I found myself literally swept along the platform into the midst of what seemed to be quite half the clerical staff of the line, who were congregated round the special coach which was provided for us. From the General Manager downward, most of the staff had turned out to bid us good-bye, and, hardly was I in the train, than the bell clanged, the coach gave a few preliminary jerks, and we were off, to the sound of a deafening cheer from those on the platform, and the strains of "For they are jolly good fellows," etc.

Owing to the peculiar position of the station at Antofagasta, trains entering and leaving have to shunt about, much as a South Eastern train has to when coming round from Charing Cross to Cannon Street and out again. Therefore three shunting engines hauled us out of the station to the "Puente," as it is called, where the two powerful express locomotives were waiting in the street, the back of the train in the

Digitized by Google

station then becoming the front. At this point the few minutes delay gave me time to bid good-bye to some personal Chilian friends who were awaiting me.

This over, I settled down to the long journey ahead, though I must not omit to mention that many friends of myself and others in the train were awaiting us at various points of our progress through the town, and gave us a cheer as the train passed. As soon as we were clear of Antofagasta, I began to think about turning in, and only then discovered that, in the hurry of leaving, the bag which I had set aside to take into the coach with me, containing my night attire, etc., together with my precious camera, had been stowed away in the van with my other luggage, which I should be unable to get at until we reached Calama early the following morning. As it happened, the Accountant was looking round to see that we were all comfortable, just as I made the discovery, and kindly lent me all that I required for the night, thus saving the situation. Very soon after this, I clambered up into my bunk, and the gentle swaying of the train soon sent me to sleep.

My awakening the next morning was one of the pleasantest I remember, for the first thing I saw when I opened my eyes was a landscape of green fields flying past the open window. Nothing remarkable in that you think, but to me, after eighteen months of life in Antofagasta, the sight was heavenly, for they were practically the first green fields I had seen since leaving England!

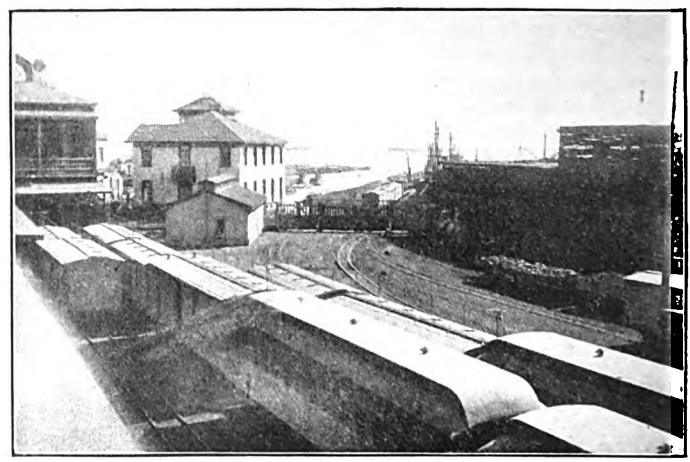
Hastily dressing myself, I hurried to the platform at the end of the coach, and just drank in great gulps of the sweet fresh air and admired the scenery. All around stretched the fertile valley of the river Loa, whilst, in the distance, stretching away for miles, could be seen the long range of snow-capped mountains forming the outer fringe of the Andes.

During the night the train had already risen over 7,000 ft. and Calama was in sight, the train shortly after slowing down and coming to a stop there, with a mighty jerk. Whilst the engines were being changed, I started off up the platform, and, after a lengthy argument with the guard, obtained entrance to the van, and, rummaging around, finally rescued my bag, to my great relief, for I had fears that I should not be allowed to get it out, in which case, I should not have been able to take any of the photographs now available for illustration.

This done, I took a few turns up and down the platform, and was soon possessed by a raging appetite occasioned by the keen mountain air. Therefore as the train started I at once made my way to the "diner" and proceeded to do justice to the excellent coffee and rolls which, together with marmalade and butter, are supplied for the first meal of the day.

Unfortunately, the fertile valley through which we had been passing does not continue for any great distance, and the train was soon out in more or less barren "pampa" once more, and, by the laboured puffing of the engines and reduced speed, it was easy to tell that we were still climbing. During the next two hours we rose almost three thousand ft. more, and about ten o'clock drew up at Conchi station.

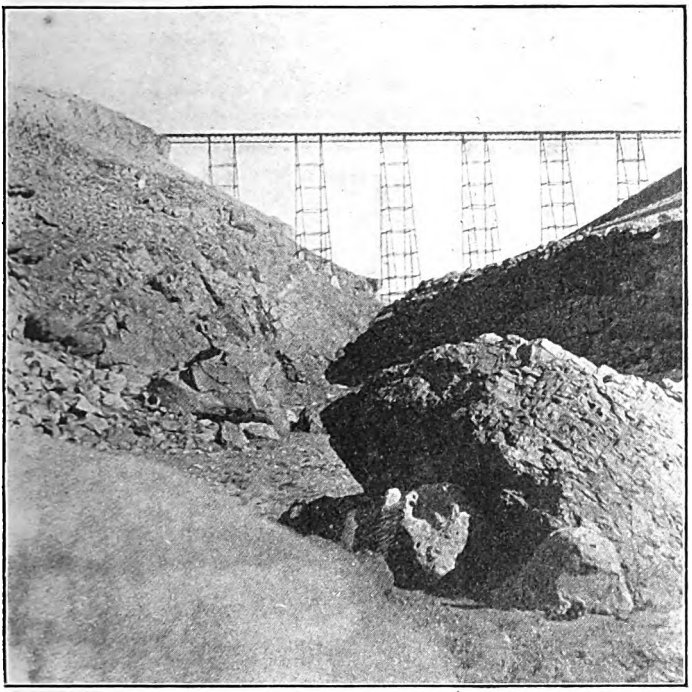
Here is the first point of real interest, for, a few hundred yards from the station, is the second highest bridge in the world, which spans the river Loa, flowing at the foot of a chasm over 300 ft. deep. As the train stops at Conchi some time for the engines to take in water, and also to allow the pilot engine to cross the bridge before the rest of the train passes over, it gives one plenty of time to cross the bridge on foot. After clambering a little way down the



Photo] [*S. M. Whitton.*

ANTOFAGASTA STATION, LOOKING TOWARDS THE SEA.

Digitized by Google



THE CONCHI VIADUCT.

chasm to get a "broadside" photograph of the bridge, I proceeded to walk over, and before I was half-way across felt like *crawling* the rest of the distance. The Loa at this point is, I believe, from 30 to 40 ft. wide, yet from above it looked like a tiny silver ribbon beneath me. Whilst I was crossing a gale of wind was blowing and howling down the chasm, and the bridge trembled and shook with every gust.

The footpath across is only about a foot wide, and is protected on one side by a hand-rail, breast-high; on the other, gloomy space just yawns at you between the sleepers, for the rails are not ballasted over the bridge. However, I crossed in safety, arriving in time to "snap" the train as it followed me over.

In the Conchi Viaduct, the F.C.A.B. have a piece of engineering to be proud of. Previous to the construction of the Victoria Falls Bridge in Central Africa, it held first place amongst similar structures. It is supported by six steel trestles, which rest in concrete foundations and, in spite of its flimsy appearance, is perfectly strong. It is, however, a strict rule that before a passenger train can pass over, the pilot engine must first proceed across to test it, the driver signalling "All's well" from the opposite side. The maximum speed for all traffic over the bridge is 4 miles per hour.

Whilst the pilot was being coupled again I had ample time to "get abroad," and very soon after getting "under weigh" once more the famous "Conchi Bridge" was lost to sight.

As the side of the Conchi Bridge faded into the distance behind us, so the twin volcanoes *San Pedro* and *San Pablo* rose up in front, and before another hour had passed we drew within the shadow of the former. The "Twins," or "Apostles" as they are called, average a height of 20,000 ft., and though both are volcanoes, only one is at present active.

This being my first sight of a "smoking mountain," I was naturally not a little curious, but whatever hopes I had of seeing a hill snorting red-hot cinders and black smoke high into the air, they were doomed to disappointment. Even with the glasses, only a faint white vapour could be discerned rising from the summit, and that was hardly distinguished from the fleecy clouds around it. However, standing as they do, quite apart from the rest of the range, they present a magnificent sight, both capped with snow, and *San Pedro* towering slightly above his "twin" *San Pablo*.

It is hereabouts, too, that the reservoirs from which the town of Antofagasta—nearly 200 miles away—is supplied, are situated. The water is carried down to the coast by a double pipe line, and represents what is practically the town's only supply. As the pipes are carried over the Conchi Bridge, should anything happen to that structure Antofagasta would immediately be without water. In view of this, a deviation of the pipe line is being constructed at that point.

It was when we reached San Pedro station that I began to feel the altitude, over 10,000 ft. above sea level, and by then the train was rapidly nearing its highest point. The "symptoms" were a throbbing behind the

Digitized by Google

ears, accompanied by slight headache and quickened pulsation of the heart; but nothing worth speaking about, the headache being all that really inconvenienced me during the whole journey, and probably so long a period of travelling was partly responsible for that.

From San Pedro onward the country teems with interest, the train being then right up in the heart of the Andes, and before very long, on every side, as far as the eye would reach, stretched a long "vista" of snow-clad peaks, every one of them higher than anything to be seen in Europe. It must, of course, be remembered that here the train is already travelling at a height approaching that of *Mont Blanc*, the highest mountain in Europe, and the surrounding mountains, even the smallest of them, are from 7 to 8 thousand ft. above that.

Soon after leaving San Pedro station the permanent way is laid across a huge river of lava, about $\frac{1}{3}$ of a mile wide, and which can be seen stretching from the very summit of the volcano, right away across country as far as it is possible to see, thus bearing silent witness that the crater from which it came was not always as quiet as it is at present.

It was just after we had finished lunch that the train drew up at Ascotan, where an inscription in Spanish, in huge white letters set on a near-by hill-side, announces the fact that "this is the highest point on the main line—3,955 metres (12,979 ft.) above sea level."

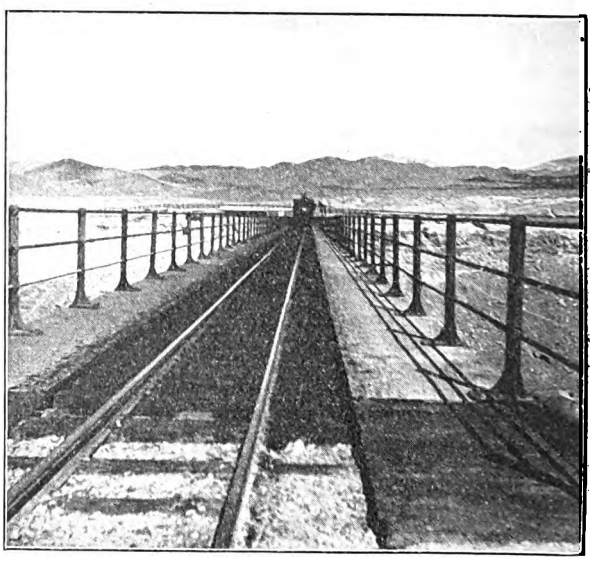
After leaving Ascotan the country rapidly became more rugged. Often we were surrounded by a landscape much more fitted for a view on a Christmas card rather than a portion of the map which is shown within the tropical zone. Glaciers and snow drifts on every side, a country absolutely desolate and devoid of the dwellings of men; although the picture presented to the eye was awe-inspiring and grand, and, when viewed from the warm steam-heated carriage, one forgot the cruel bleak nature of the surroundings.

A few minutes before running in to Cebollar station I caught my first glimpse of the "Borax Lake." Little did I think when I read of this wonderful piece of Nature's handiwork in my school books, that it would be my lot to see it. No photo could give any idea of the beauty of it.

Imagine the first occasional glimpses, caught between deep clefts in the mountains, of a dazzling expanse of white, glittering in the sunlight like a carpet of diamonds; and then, as the train suddenly emerges from a cutting, the whole huge lake spread out suddenly before the eyes. I could hardly repress a gasp of wonder at the sight, though I was destined to get rather tired of it before long, for the train continues to run alongside the lake for nearly an hour.

A stop of ten minutes at Cebollar station enabled me to take a brief look round, and, though the sight is a wonder to the first-time traveller in these parts, I began to think that, compared with Cebollar, Antofagasta is a paradise. The only excitement that the little colony, composed of the employés of the "Borax Consolidated, Ltd." who live at the works, ever get, is the advent of the tri-weekly passenger train.

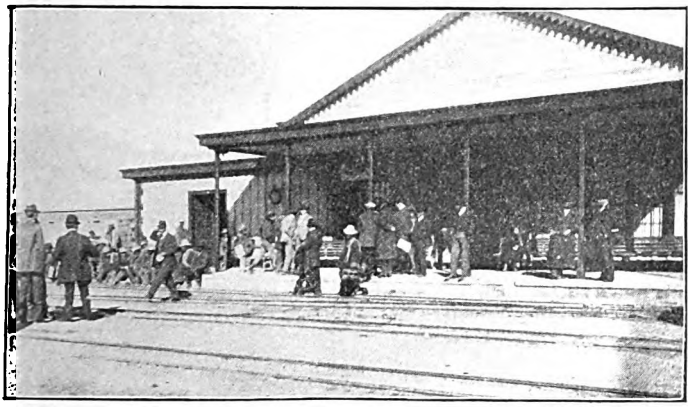
There are quite a number of Englishmen holding positions in the works. The deposits of borax are practically inexhaustible, for as fast as taken away it is replenished by some mysterious agency. The actual depth of the deposit is unknown, and though, I am told, water is at times "struck" beneath the crust, it is a matter of conjecture whether this huge expanse is really a lake or not. During the brief time at my disposal I



Photo] [*S. M. Whitton.*

LOOKING ACROSS THE CONCHI BRIDGE.

Digitized by Google



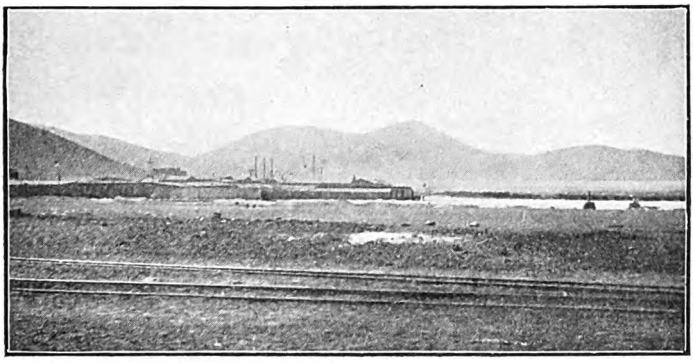
Photo] [*S. M. Whitton.*

ORURO STATION.

examined a handful scooped from the edge of the lake, and the nearest "simile" I can think of is damp table salt.

So interested was I in all around me, that I eventually had to do a sprint for the train. It was then quickly brought home to me that "altitude" makes a world of difference to one's breathing apparatus. I do not suppose that I ran more than twenty yards, but on boarding the train I just collapsed into the nearest seat. It might have been a run of twenty miles that I had taken to judge by my quite audible gasps for breath, and nothing but a sudden and very violent fright could, under normal circumstances, have made my heart perform the "high jumping" and sledge-hammer evolutions it did. For about a quarter of an hour I was just "done to the world," but I calmed down in time to observe that we were actually crossing the lake, which proved that, if water really exists beneath the deposit, it must be a long way down, for the crust to bear the weight of a heavy train.

The following five hours can best be described as a continuous panorama of salt plains fringed with high mountains.



Photo] [*S. M. Whitton.*

THE "BORAX CONSOLIDATED" COMPANY'S WORKS, BORAX LAKE, CHILI.

(To be continued.)

Digitized by Google

TUNBRIDGE WELLS STATION (LONDON BRIGHTON AND SOUTH COAST RAILWAY): South Eastern and Chatham Railway train in bay to right.

The London, Brighton and South Coast Railway in East Sussex.

[No. II.]

By J. FRANCIS.

AT Heathfield the line crosses the great Forest Ridge, 500 feet above sea-level. This also is a favourite touring centre. Heathfield Tower is said to give a view from its summit covering a circle of some 30 miles in diameter, reaching to Eastbourne and the sea on a clear day. The station has the distinction of being lighted by natural gas, discovered in boring for water. Incidentally, but very important from the railway company's point of view, this district is now in considerable favour for residential purposes, and the development of the train services should do much to foster this tendency, seeing that Mayfield and Heathfield have so much to offer.

Between Mayfield and Heathfield a short tunnel is traversed, built for two tracks, though only one is in use. Waldron is another very pretty station, also serving Horeham Road, and near Hellingly (the only non-crossing station on the branch), the waters of the Cuckmere are bordered for a short distance. Here also nature has provided much to interest.

Hailsham is a considerable market town, which no doubt explains why it was provided with railway facilities at so early a date. It has also several local industries and a weekly cattle market. In fact, its traffic demands several short trains from Eastbourne and Polegate terminating here, in addition to the through trains on the branch.

At Polegate the Hastings main line is joined, the single line from Hailsham coming in at the western end of the platform *vid* a sharp curve. Polegate has two island platforms as required by its special traffic, and like virtually all junction stations on the Brighton line has its refreshment rooms.

As there are plenty of trains or rail motors towards Lewes, it will be best to follow the Uckfield line from the junction serving the County Town of Sussex. The trains for Tunbridge Wells start from Brighton, Uckfield or Crowborough, so that a very convenient route is provided. Rising from Lewes to cross the goods yard by the viaduct illustrated in the June RAILWAY MAGAZINE, a bifurcation is made at Culver Junction, about two miles out, the Uckfield trains serving Barcombe Mills station, while East Grinstead trains serve Barcombe itself.

At Isfield the distinctive feature is the down platform, which is bordered by trees and flower beds in a way which is decidedly

Digitized by Google

Digitized by Google

EAST GRINSTEAD STATION: LOW LEVEL PLATFORMS.

and is used by trains between Three Bridges and Tunbridge Wells, as also by trains from London which use the spur before referred to, instead of running direct to the lower station. The latter is nearly at right angles, but all platforms are well connected. There are neat station buildings and refreshment rooms, while in many cases three or four trains are arranged to connect here one with another.

Proceeding south an interesting viaduct is traversed followed by a high embankment. Kingscote station is notable for the display of roses in the platform gardens, and at Horsted Keynes one is again in a district remarkable for the beautiful scenery visible from the carriage windows. Here is a four-road five-platformed station, one island used exclusively by Lewes trains, while both can be used by trains towards Hayward's Heath. The down Lewes line has platform faces on both sides. The station as a whole is an exceptionally neat and artistic one.

To Hayward's Heath the branch is only a short one, though it carries a good deal of traffic and is double track. To Lewes the line is single track, and passes through very pretty country as it serves Sheffield Park, and Newick and Chailey before reaching Barcombe station (non-crossing) and joining the Uckfield line at Culver Junction.

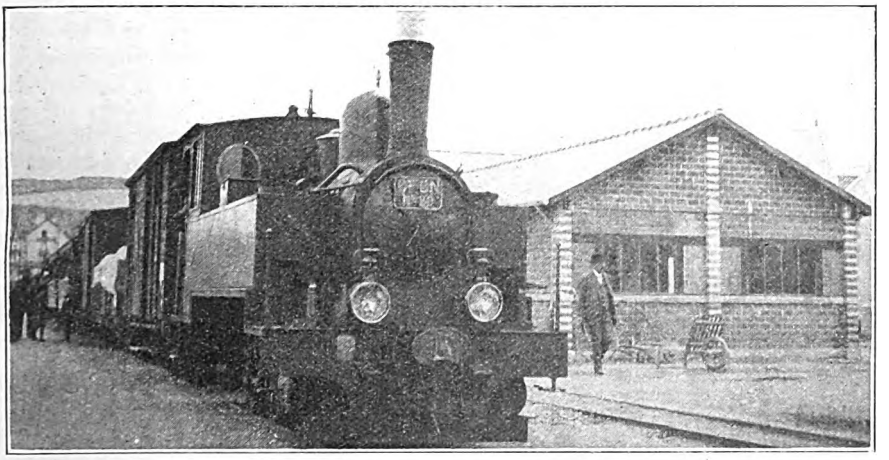
Smith & Son.] [*London.*

EAST GRINSTEAD STATION: EXTERIOR.

Digitized by Google

One might almost include the main line as one of the scenic attributes of Sussex in view of the beautiful country traversed in the neighbourhood of Wivelsfield, Hayward's Heath, Balcombe (despite the lengthy tunnel) and Three Bridges, and the journey along the base of the downs from Keymer Junction to Polegate; but the foregoing will be sufficient to indicate that the branch lines above referred to and the country served thereby are well worthy of a visit, while the whole of the area covered is full of interest from all points of view.

Train services now provided are so good, considering the severe grades, curves and traffic complexities, that these districts are brought within easy reach of London. In fact, when analysed, the distances are all between 30 and 50 miles from the Metropolis, while at the hours of business travel there are fast trains direct to the Sussex routes described. Tunbridge Wells is served as well as, or better than before, by slipping or dividing at Ashurst, and the connections at Groombridge are now largely done away with, considerable accelerations being realised in the case of Eridge, Crowborough, Uckfield, Mayfield, Heathfield and other stations affected.



Photo] [*E. A. Gurney-Smith.*

CÔTES DU NORD RAILWAY OF FRANCE.

St. Brieuc-Portrieux train at Binic. 0–6–0 tank engine No. 20. The photograph was taken on the day when mobilisation of the French Army was proclaimed.

Digitized by Google

Leaves from the Log of a Locomotive Engineer [No. XXIV.].

RAILWAYS IN WAR TIME.

By ROBERT WEATHERBURN.

Mr. Weatherburn, as will be realised by all who have read his interesting reminiscences published in the RAILWAY MAGAZINE *month by month during the last two years, is peculiarly well qualified to discuss German methods, while his practical acquaintance with their operations, both military and railway, during the Franco-German War, and his close study of military and naval problems, entitle his remarks to be carefully considered.*

MORE than forty years ago the writer had exceptional opportunities, in a semi-official capacity, of seeing what had been accomplished by the German armies in Alsace and Lorraine; and, as a result, without bias or prejudice, has persistently preached the necessity and duty of preparedness on our part, both in private life, and as a member of the Executive Council of the Navy League, and later as a member of the Executive Committee of the Imperial Maritime League. The undeviating policy pursued in Germany, in carrying out the programmes laid out by the great framers of strategy, aided by the far-seeing Treitschke, for the supremacy of Germany, both in military and naval affairs, has so far met with the most signal success, as witness the wars waged in 1864, 1866 and later 1870.

Little has been written concerning the use of railways during war time. With the striking exception of Lord Kitchener's brilliant feat in forcing the construction of the Soudan (Narrow Gauge) railway, which gave us the victory of Omdurman, and our after humiliating experience on the South African railways, where the Boers (a pastoral people) gave us some painful lessons in train wrecking and blowing up, we, who justly claim to have been the pioneers in railway enterprise, have given less time to this important subject than any fourth-rate power although, from an aggressive and defensive standpoint, it means so much in the future to the stability of the Empire. This is partly due to the immunity from invasion hitherto enjoyed by this country. But our insular position is no longer entirely relied on, although we may be girt round with a ubiquitous navy, now that airships and aeroplanes have become potential factors in aggressive warfare, more particularly when used in creating a diversion or serving as an auxiliary to a hostile flotilla.

The nationalisation of railways on the Continent was due largely to military strategy, and came as a sequence to universal military service. Therefore, the State has the first call upon them, and that primary object is never lost sight of, discipline and systems of management being merely mild continuations and applications of the military training that preceded it. Further, in order to prevent any misunderstanding or jealousy, and to ensure united action among the several railway administrations in war time, a separate executive exists in Germany called the Eisenbahn Korps which is composed of the *élite* of railway workers of every rank and station. State ownership of railways in Germany, along with universal military service, have contributed to an unequalled efficiency in this particular body, without in the least detracting from its efficiency in time of peace.

As stated, the corps embraces every class of railway man, from the ordinary shunter or train arranger to the smartest of traffic managers, and the civil and mechanical engineering departments are supervised by men of tried experience, qualified by actual service. Indeed the *personnel* constitutes an unrivalled reserve of experts, with the additional advantage of having had military training which puts them on an easy and friendly footing with the military when acting in common.

Digitized by Google

The system of training and advancement on the State Railways tends to bring the best men to the front. Status or rank is everything in Germany, and there are no exceptions on railways. Engine drivers are divided into three classes: first, second and third. Merit in the way of proficiency and conduct is the key to promotion. Each rank is distinguished by its peculiar badge or facing. The system of training in technical subjects and examinations for the various grades or classes is so complete and elaborate that their enumeration and description would be tedious and out of place. Every encouragement is given, not by direct gratuities or monetary rewards, but by a system of endorsements or marks which count up and assist to promotion. Commendable recognition is given for the display of ingenuity or ability under trying circumstances, particularly to ingenious or simple devices employed when dealing with the unexpected, such as machinery defects and bringing their trains home with the least loss of time or inconvenience.

Men in the premier class are not only good drivers, but as a rule well grounded in the principles of combustion and generation and the economic use of steam. A great number are fully capable of estimating and diagnosing their engines, both by formulæ and instruments. Still further, the men of the first class are qualified to, and do make excellent reports, accompanied when necessary with explanatory drawings, generally to scale.

The faculty to observe and analyse, so peculiar to the German character, is cultivated and encouraged. Although not within the strict round of their duties they are taught by implication to estimate a railway from the qualifying stand points of aggression, defence, and if needs be temporary disablement or wrecking, as well as utility for commercial purposes.

I again wish it to be understood that I refer to the first class drivers only, but discipline, training and examinations are constantly contributing to that rank. Right through the whole system of German railways, however devoted to commercial needs, is recognisable the ultra-military purpose to which they can be at once diverted. All the rolling stock shows unmistakeably by its construction and special features of design the purpose for which it can be used.

In Russia each wagon has, or had, painted on the outside indications showing its carrying capacity in horses or men—8 horses or 40 men. There is not a vehicle on the State Railways of Germany but which must be approved by the military authorities before being built, and it must be adaptable to military ends, or conveyance of men or horses when need arises. Special low-bodied trucks are provided with clips, chains, chocks, wedges, etc. for the handy loading and securing of light and heavy artillery during transport. For heavy siege and naval guns, massive heavy compound or vertebrated steel trucks ingeniously constructed so as to allow for the give and take (lateral play) required for the conveyance of long, heavy weapons, are used.

In other Continental countries, too, somewhat similar methods are adopted, though possibly not to the extremes reached in Germany. The fact that every able bodied railway man in Russia, Germany, Austria and France is a disciplined unit of a great military system, and virtually an expert in the particular duties he may in a moment be called upon to perform, is in itself of undeniable importance during any crisis that involves invasion or defence.

It must not be supposed that any consideration would be shown during a sporadic raid, or in the event of retirement or defeat, to prevent the worst form of wreckage. The men who shot down Franc-Tireurs and civilians in the Franco-German War (on the score that they were not legalised to carry arms, even in defence of their country, not being regular soldiers) have little respect for the laws of humanity.

The mishaps and train wreckage which befell us during the Boer War in South Africa, although humiliating, and disastrous, would be mere child's play to what we should receive at the hands of these professional, and trained train-wreckers.

At the same time, if anything in the foregoing may have led to the belief that wilful or haphazard damage is the rule prescribed in Germany, then I have written in vain. The nature and amount of such damage obstruction or wreckage done is left to the consideration and judgment of the head of the corps and is in accordance with the strategy pursued. But no other consideration exists beyond doing the work well and in their own way and at whatever cost of life or men. This accounts for the care given to cultivate the powers of observation in their working staff.

(*To be continued.*)

Digitized by Google

100 Mile Runs in 1914.

Although as we go to press many alterations have been made by reason of the European war, virtually all arrangements prepared to meet the demands of the summer traffic were in force for at least a few days; and therefore, following our practice for many years past, the usual review of non-stop runs of more than 100 miles is now presented. Sunday services are now included, though some of them are direct or indirect equivalents to week-day services. It is difficult in some instances to decide upon the correct treatment of runs including conditional stops, but as far as possible foot-notes are given in reference to these and other special features. Slip journeys are mentioned separately, and in the case of the Great Western Railway the start-to-stop and "slip" journeys are differentiated thus: 2+1, the latter figure applying to slip coach times.

Caledonian Railway (Ten Runs).

Between	Miles.	No. of Runs.	Journey by Fastest Train.	Speed Miles per Hour of Fastest Train.	Fastest Train.
			H. M.		
Carlisle and Perth	150¾	3	3 5	49·7	1.15, 1.40 a.m. D.
Carlisle and Stirling	117¾	2	2 25	49·6	2.20 a.m. D.
Carlisle and Glasgow (Central)	102¼	3	2 5	48	5.55 a.m. D.
Carlisle and Edinburgh (Princes Street) ..	**100¾**	**2**	**2 0**	**50·3**	**10.5 a.m. U.**

NOTE.—The down trains from Carlisle to Perth, Glasgow and Edinburgh usually stop at Beattock for taking water and for assistance. If assisted from Carlisle, a stop is made at the summit for detaching the pilot. Therefore the non-stop runs to Perth are generally only 111 or 101¼ miles, while those to Glasgow, Edinburgh and Stirling are under 100 miles in length. Certain trains also have conditional stops which, if not allowed for, add several other items to the list.

Great Central Railway (Six Runs and One Slip Journey).

Between	Miles.	No. of Runs.	Journey by Fastest Train.	Speed Miles per Hour of Fastest Train.	Fastest Train.
			H. M.		
Marylebone to Sheffield *viâ* Aylesbury	164¾	1	2 57	55·85	3.15 p.m. D.
Marylebone and Leicester *viâ* High Wycombe	107½	4†	1 54	56·58	6.20 p.m. D.
Marylebone and Leicester *via* Aylesbury	**103**	**1***	**1 49**	**56.7**	**3.15 p.m. D.**
Leicester and Marylebone *viâ* Aylesbury	103	1	2 15	45·77	1.39 a.m. U.

* By Slip Carriage. † Including trains run on certain days only.

Great Eastern Railway (Seven Runs).

Between	Miles.	No. of Runs.	Journey by Fastest Train.	Speed Miles per Hour of Fastest Train.	Fastest Train.
			H. M.		
Liverpool Street and North Walsham	131	2	2 38	49·7	1.0 p.m. D.
Liverpool Street and Yarmouth (South Town)	121¾	3	2 30	48·7	10.20 a.m. D. and 1.40 p.m. U.
Liverpool Street and Trowse	**114**	**1**	**2 17**	**49.9**	**9.50 a.m. D.**
Liverpool Street and Beccles	109¼	1	2 23	45·8	1.53 p.m. D. (Sats. only).

Digitized by Google

Great Northern Railway (Twenty-Nine Runs).

Between	Miles	No. of Runs	Journey by Fastest Train	Speed Miles per Hour of Fastest Train	Fastest Train
			H. M.		
Wakefield (Westgate) and King's Cross	175¾	1	3 5	57·0	2.20 p.m. U.
King's Cross and Doncaster	156	3	3 0	52·0	9.50 a.m. D.
Retford and King's Cross	138½	1†	2 31	55·0	8.59 a.m. U.†
York and Peterboro'	111¾	2§	2 13	50·4	3.45 a.m. U.§
King's Cross and Grantham	**105½**	**22‡§**	**1 50**	**57·5**	**5.58 p.m. U.**
Finsbury Park and Grantham	103	1	2 3	50·2	11.32 a.m. D.*

* Fridays and Saturdays only. † Not on Mondays. ‡ Including 8.59 a.m. up from Retford, which calls at Grantham on Mondays.
§ Including runs during Sunday, some of which are actually equivalents to weekday services.

Great Western Railway (Forty-One Runs and Six Slip Journeys).

Between	Miles	No. of Runs	Journey by Fastest Train	Speed Miles per Hour of Fastest Train	Fastest Train
			H. M.		
Paddington and Plymouth North Road *viâ* Westbury	225¾	1	4 7	54·8	10.30 a.m. D.
Paddington and Newton Abbot ..	193¾	2‡	3 25	54·0	9.30 a.m. D.‡
Paddington and Exeter *viâ* Westbury..	173⅝	6+1	3 0	57·8	*10.30 a.m., 12 noon, 3.30 p.m. D., 1.45 p.m. U., †10.30 a.m. D.
Paddington and Taunton *viâ* Westbury	142⅞	4+3	2 30	57·1	*10.30, *12 noon, *3.30 p.m. D., 11.0 a.m. U., 6.10 p.m. U., †2.45 p.m. D.
Paddington and Newport *viâ* Badminton	133⅜	*a*6	2 30	53·35	11.30 a.m., 8.30 p.m. D.
Paddington and Worcester	120½	3	2 9	55·7	4.45 p.m. D.
Paddington and Bristol *viâ* Bath ..	118¼	1	2 0	59·1	11.0 a.m. D.
Bristol and Paddington *viâ* Badminton	117⅝	5	2 0	58·8	1.5 p.m. D., 12.0 noon and 5.5 p.m. U., †4.30 p.m. D.
Paddington and Birmingham	110½	4	2 0	55·25	11.5 a.m. and 2.35, 4.0 and 6.5 p.m. D.
Paddington and Bath	**106⅞**	**4+1**	**1 48**	**59·4**	***11.0 a.m. D.**
Paddington and Frome	101¼	1	1 47	56·7	10.35 a.m. D.
Paddington and Knowle	100¼	0+1	1 48	56·0	*4.0 p.m. D.
Paddington and Badminton	100	*b* 3	1 42	58·8	*3.35 p.m. D.
Reading and Taunton	106¾	1	1 58	54·2	2.10 p.m. D.

* By slip coach. † Sunday trains. ‡ Specified days only.
a 3.35 p.m. D, and 1.50 p.m. U, have conditional stops at Badminton. *b* 3.35 p.m. D, and 2.38 p.m. U, are conditional stops.

London South Western Railway (Four Runs).

Between	Miles	No. of Runs	Journey by Fastest Train	Speed Miles per Hour of Fastest Train	Fastest Train
			H. M.		
**Waterloo and Bournemouth Central .. ..

London and North Western Railway (Seventy-Five Runs and One Slip Journey).

Between	Miles.	No. of Runs.	Journey by Fastest Train.	Speed Miles per Hour of Fastest Train.	Fastest Train.
			H. M.		
Euston and Rhyl	209¼	1	3 58	52·7	11.10 a.m. D.
Rhyl and Willesden	203¾	1	3 54	52.2	3.38 p.m. U.
Euston and Liverpool (Edge Hill) ..	192¼	1	3 28	55·45	6.0 p.m.D.
Euston and Warrington	182¼	2§	3 28	52·5	11.45 p.m. D.
Euston and Wilmslow	176¾	2	3 11	55·0	6.10 p.m. D.
Willesden and Warrington	176¾	1	3 22	52·0	11.37 a.m. D.
Euston and Crewe	158	8§	2 51	55·5	*10.30 a.m. D.
Crewe and Willesden	152½	10§	2 46	54·8	9.56 a.m. U. Sundays, 6.16 p.m. U. Weekdays
Crewe and Carlisle	141	14§	2 40	52·8	10.55 p.m. D.
Stoke and Willesden	140½	1	2 29	56·9	1.19 p.m. U.
Euston and Stafford	133½	3	2 22	56·0	5.30 p.m. D.
Stafford and Willesden	128	2	2 16	56·2	11.40 a.m. U.
Euston and Rugeley	124¼	†1	2 15	55·2	2.40 p.m. D.
Warrington and Carlisle	116¾	2§	2 17	51·2	3.19 a.m. D.
Euston and Birmingham	113	13	2 0	56·5	All non-stop trains.
Crewe and Bletchley	111¼	2§	2 16	49·0	4.22 a.m. U.
Willesden and Birmingham	**107½**	**3§**	**1 53**	**57·0**	**8.52 a.m. D., 5.32 p.m. D. Sun. and 11.30 a.m. U. Sun.**
Crewe and Holyhead	105¾	4§	2 4	51·4	2.0 a.m. U.
Wigan and Carlisle	105	5§	2 3	51·7	12.11 a.m. D.

* The 10.30 a.m. D from Euston calls at Crewe at 1.21 p.m. for division. If divided throughout, the respective sections run through to Edge Hill or Wilmslow without stop. † By slip carriage.
§ Including journeys during Sunday, some of which may be actually equivalents to weekday services.

Midland Railway (Twenty-Five Runs).

Between	Miles.	No. of Runs.	Journey by Fastest Train.	Speed Miles per Hour of Fastest Train.	Fastest Train.
			H. M.		
St. Pancras and Shipley	206	1	4 3	50·86	11.50 a.m. D.
Leeds and St. Pancras	196	1	3 40	53·45	3.40 p.m. U.
Rotherham (Masboro') and London ..	161¾	1	3 2	53·32	1.43 p.m. U.
St. Pancras and Derby	128½	2	2 18	55·87	7.10 p.m. D.
London and Nottingham	123¼	*7	2 13	56·1	6.2 a.m. U.
Trent and St. Pancras	119¾	†2	2 10	56·0	8.15 p.m. U.
Leeds and Carlisle	113	‡10	2 17	49·49	12.38 a.m., 1.48 p.m., 11.8 p.m. D. ; 1.35 p.m. U.; 1.50 a.m. U. Sundays.
Shipley and Carlisle	102	1	1 58	51·01	11.50 a.m. *ex*-London.

* Including 11.33 a.m. D Saturday Excursion for Scotland, and the 9.30 p.m. D, which has a conditional stop at Kettering.
† Both the 6 p.m. D from St. Pancras, and the 8.15 p.m. U have conditional stops at Luton.
‡ Including Sunday trains, but omitting certain runs where conditional stops are regularly made.

North Eastern Railway (Fourteen Runs).

Between	Miles.	No. of Runs.	Journey by Fastest Train.	Speed Miles per Hour of Fastest Train.	Fastest Train.
			H. M.		
*Newcastle and Edinburgh	124½	†14	2 18	54·1	11.14 a.m. D.

* East Coast Trains drawn by North Eastern Railway engines but between Berwick and Edinburgh on North British Railway.
† Including one up and one down horse box, carriage truck, and motor-car train, which "runs only when required," also trains during Sunday.

Digitized by Google

Restall's Trips.

The Story of a Great Enterprise.

MANY people there are who find a fascination in the study of the genesis of a great movement or the gradual growth of a successful commercial concern and to such the evolution of the railway half-day excursion under the direction of Mr. Frederick J. Restall, the pioneer of half-day trips from London, will strongly appeal.

Although a novelty for Londoners when introduced by Mr. Restall, afternoon trips to the seaside were in operation in the north of England a generation ago. When on his holidays in 1881 Mr. Restall observed that a half-day excursion was run from Hull to Bridlington and Scarborough. The distance is 53 miles, and the train left Hull at 1.15 p.m., allowing 7 hours at Scarborough before returning home. The time allowed each way was 90 minutes; the return fare to Bridlington being 1s. 6d. and to Scarborough 1s. 9d.

To Mr. Restall the idea appeared excellent and in his capacity of Honorary Secretary to the Cambridge Early Closing Association he initiated half-day trips from Cambridge to Hunstanton (60 miles) and Holkham (70 miles) in June and August, 1885, respectively. Mr. Restall's first trip to Hunstanton was run on Thursday, 25th June, 1885, and the present writer, who was then resident in the university town, well remembers the popular excitement that prevailed over what was considered a remarkable and unprecedented event. All the available tramcars—which were of the one-horse variety—were requisitioned to start from the Cambridge General Post Office in time to enable would-be passengers to catch the train, the shopping centre of the town being quite a mile from the railway station. The tramcars, by the way, the joy and pride of Cambridge townsmen in the 'eighties, no longer jog along the historic highways; the motor-omnibus provides the penny and twopenny rides to-day.

Mr. Restall afterwards removed to London and became secretary of an organisation called the South London Early Closing Association, with offices at 158, Borough High Street. The aim of the society was to secure by voluntary and conciliatory methods only a reduction in the long hours of shopkeepers and their assistants, and to provide ways and means by which such people might pleasurably employ the increased leisure obtained by the society's efforts. At first concerts, games and brake drives were the only recreations attempted, but Mr. Restall, with the example of the north of England in his mind and his experience as a half-day trip promoter at Cambridge behind him, felt there was a large future before the society.

As a consequence, the South London Association became the "Voluntary" Early Closing Association and in 1892 its business had outgrown the accommodation in the offices at Borough High Street, a move being therefore made to Cheapside.

In 1894 Mr. Restall initiated trips to Brighton, Hastings and other popular South Coast holiday resorts, with a view of popularising the two o'clock Wednesday and Thursday Closing Movement; and a little later he introduced trips from Brighton to London.

For several years before he was successful in obtaining the innovation Mr. Restall endeavoured to persuade the London, Brighton and South Coast Railway to run a half-crown afternoon trip to Brighton. The company were willing to run a train at a 3s. fare if 250 passengers were guaranteed—arguing that it cost as much to run a train for half as a whole day, but at last the suggestion of Mr. Restall was agreed to and the first half-crown excursion left

Digitized by Google

Digitized by Google

On Wednesdays trips may be made to Littlehampton, Arundel, Seaford, Newhaven and Lewes. On Wednesdays and Thursdays Whitstable Town, Herne Bay, Margate, Broadstairs, Ramsgate and Brighton are on the list. While on Thursday only, Portsmouth, Fratton for Southsea, Selsey-on-Sea, Bognor and Chichester are available by trip. The foregoing does not exhaust the list of Mr. Restall's activities, but simply enumerates some of his cheaper trips—those of the half-crown to three shillings and sixpence variety.

Mid-week trips to the Kent and south coasts are run by Mr. Restall all the year through, and even in winter they are well patronized. Every Tuesday, all the year round, express excursions run from London (Marylebone station) by Great Central Railway to Leicester, Loughborough, Nottingham, Sheffield and back. The train leaves London at 11.30 a.m., and the travellers are back in town 10.40 p.m. Fares are 4s. 6d., 4s. 9d., 5s., and 6s. respectively, and a 2s. 6d. luncheon and a 2s. supper are served on the train.

That the trips have met "a long felt want" is evidenced by the patronage they obtain. The number of passengers travelling with Restall's tickets, January to June last inclusive, exceeded 100,000, and, as RAILWAY MAGAZINE readers are aware, this period includes the least important holiday seasons of the year.

Recently Mr. Restall introduced to the London Brighton and South Coast Railway the possibility of running evening trips to Brighton and other resorts, leaving town about 5.30 p.m. In his opinion many business men would be glad to spend the evening by the sea once a week and he further considers in view of city warehouses now closing earlier on Saturday, if half-day trips could be fitted in they would meet with great support.

Mr. William Forbes, (General Manager, London Brighton and South Coast Railway) commenting publicly on Mr. Restall's latest proposals, reminded his hearers he was formerly engaged on the London Chatham and Dover Railway and that it was twenty years ago since he instituted the half-day trips to Herne Bay. He very nearly "got the sack" over it. His chairman sent for him and wanted to know what he was up to. Some passengers had been seen travelling by it with portmanteaux, and it was suggested that the trip was simply robbing the ordinary traffic. He, however, went on with the trips, and they turned out a very great success. On the London, Brighton and South Coast Railway they carried last year 3,750,000 passengers on excursions at cheap fares. He was quite in sympathy with Mr. Restall's suggestion to encourage as much as possible this cheap travel, but there was a limit to the capacity of a line, and he hesitated at the idea of more trains at half-past one on Saturday afternoon, or at half-past five during the week, to the seaside.

It was Mr. G. R. Sims, the world-famous purveyor of "Mustard and Cress" in *The Referee*, who suggested that in these days of hurry and travel an excellent motto would be "Rest-all and be thankful."

W. PARKER.

Digitized by Google

Presentation to Sir Albert Stanley.

A "T.O.T." TRIBUTE.

TO supplement the honour of knighthood conferred upon him by H.M. The King, the managing director of the Underground Electric Railways Company, of London, has been the recipient of a handsome presentation from the staffs of the systems under his capable control.

The suggestion of a presentation emanated entirely from members of the staff of the "T.O.T." group, and a stipulation was made by the promoters that no member of the staff or officer could contribute more than the sum of one penny. Approximately 20,000 pennies were collected from the employés of the Company, covering the—

Metropolitan District Railway,
The London Electric Railway,
The Central London Railway,
The City and South London Railway,
The London General Omnibus Company,
The Associated Equipment Company, and
The London United Tramways.

The presentation took the form of a silver tea and coffee service—a replica of an old Georgian pattern—and a handsome album containing the 20,000 signatures of the staff. The inscription was—

"Sir Albert Stanley.

"From nearly 20,000 employés of the T.O.T. Companies, in appreciation of the honour conferred by His Majesty The King—22 June, 1914."

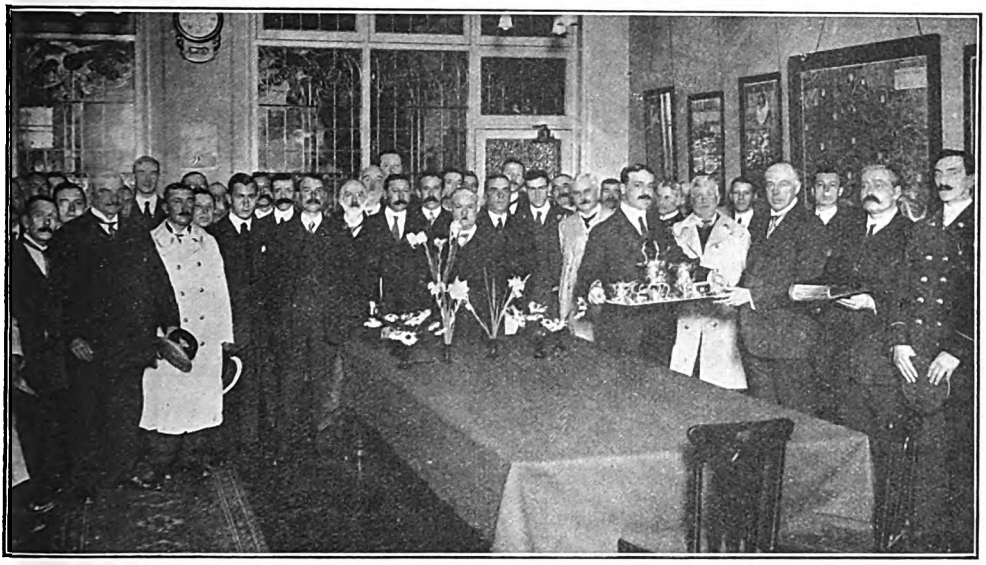
The album, which contains the names of 20,000 signatories, has been divided into sections, the title page bearing the letters "T.O.T."—the first section "T," denoting trains, contains the names of the employés on the railways; the second, "O," the employés of the London General Omnibus Company, and Associated Equipment Company's employés; and the third section under "T"—indicating trams—the signatures of the London United Tramways employés.

Mr. W. E. Mandelick (secretary of the Associated Companies), in making the presentation, said: "I am very glad to see so many employés of the Company present. It is really remarkable the way in which this subscription has been got up, and I am sure that the book containing your names will be looked upon by Sir Albert Stanley as a charming memento of the occasion." Turning to the recipient, Mr. Mandelick continued: "Sir Albert Stanley, it is with the liveliest sense of satisfaction that I have accepted the pleasant duty to act on behalf of the Committee, which represents all departments of the railways, omnibuses, tramways, and shops under your control. We are assembled here to-day to convey to you, Sir, an expression of the esteem and regard held by the men for their chief. To show you how widespread the feeling is, 20,000 employés have subscribed one penny each—that being the maximum sum contributable—for the purchase of this silver service, which I have been requested to present to you in testimony of their profound respect for you as their Managing Director, and their sincere affection for you as a man. Every member of our staff, from the highest official to the lowest, feels that he shares with you in the honour which has recently been conferred upon you by His most Gracious Majesty The King. This bound volume, which we also present to you, contains the signatures of the men who wish to do you honour. In years to come it will serve as a memento of this occasion, and through your career—which we hope will be long and successful—the names inscribed will testify to the deep and personal interest they will always continue to have in your welfare. After your arduous labours you are about to leave on a well-merited holiday, and we trust that, upon your return, you will be re-established in health as firmly as you are lodged in the affections of the men who are to-day represented here. It has been the wish of the staff that members representing the outdoor staff should address you, and Mr. Harris (a motorman of the District Railway), Mr. Barr (a conductor in the service of the General Omnibus Company), and Mr. Miles (from the works department of the London United Tramways) will supplement my remarks."

Suitable speeches having been made by the men, Sir Albert Stanley (who spoke with great emotion) said: "My good friends, this is the most difficult thing I have ever had to do in my life. That it has been most unexpected I feel sure you will agree with me goes without saying. I shall be very brief. I only want to say this—all I ask is that in the work we are trying to do here that I shall always have—and I shall always try to deserve—the esteem and friendship of all the men who are working with me. I do not think I need say to you as representing the men, that what I have tried to do with these undertakings has been done because I thought that I might be instrumental in doing something which was going to benefit all of us who are engaged in this great enterprise. With reference to the honour which the King has conferred upon me, one of the greatest pleasures and greatest satisfactions arising out of it has been

Digitized by Google

what I take to be the universal expression on the part of all the men in sending me their congratulations and their good wishes in connection with that honour. The fact that all our men, so far as I know, have found some pleasure in the honour which has been conferred upon me has been an extremely great pleasure to me, arising, as it does, out of that honour, and if in future years I can, in attempting to do the work which still remains to be done in connection with these properties, still retain your friendship, then I shall think that I have done some good work. In dealing with properties of this kind, there is more than one problem to be considered. We have to consider the staff, we have to consider the shareholders, and we have to think of the public. But if you say to me, as I have heard it said this morning by the representatives of the men, that in all that we have done in considering these problems I have dealt fairly with the staff, then I am quite content with what I have done. I feel, as I hope all of you do, that we are working shoulder to shoulder in these problems. What is your problem is my problem, and what is my problem is your problem. We are standing together shoulder to shoulder to make a success of this great undertaking, and to endeavour to make the people of London proud of their transport system, and to set up an ideal system for the world to follow, and, at the same time, we desire to make every man in the service feel that he is proud of his company. If I can be of any assistance in doing that I shall be contented. Now, about this gift. I really cannot tell you how deeply I appreciate it, but I can assure you that it will always stay with me. Above all, I can assure you that whenever I look at it, it will bring back the recollection of this morning and cheer me on and encourage me to try and do more, if I possibly can, for all the men who are working with me. To those who have been instrumental in providing this splendid gift I would extend my heartfelt thanks, and I wish you to convey to all those with whom you are associated how deeply I appreciate from the bottom of my heart their personal devotion to me, and I may say that all through my life I shall try to be worthy of that devotion."



Photo] [*L.N.A., London.*

SIR ALBERT STANLEY RECEIVING THE PRESENTATION FROM MR. W. E. MANDELICK.

Digitized by Google

PERTINENT PARAGRAPHS

British Railways "Nationalised."

FROM the railway point of view the most important feature of the present situation is the fact that, without reference to any railway nationalisation propaganda whatever, all the principal railways of the United Kingdom have been taken over by the Government for the time being, under the Regulation of the Forces Act of 1871. The clause of this Act providing for this reads as follows :

"When Her Majesty, by order in Council, declares that an emergency has arisen in which it is expedient for the public service that Her Majesty's Government shall have control over the railroads in the United Kingdom, or any of them, the Secretary of State may, by warrant under his hand, empower any person or persons named in such warrant to take possession in the name or on behalf of Her Majesty of any railroad in the United Kingdom, and of the plant belonging thereto, or of any part thereof, and may take possession of any plant without taking possession of the railroad itself, and to use the same for Her Majesty's services at such times and in such manner as the Secretary of State may direct ; and the Directors, officers and servants of any such railroad shall obey the directions of the Secretary of State as to the user of such railroad or plant as aforesaid for Her Majesty's services.

"Any warrant granted by the said Secretary of State in pursuance of this section shall remain in force for one week only, but may be renewed from week to week so long as, in the opinion of the said Secretary of State, the emergency continues.

"There shall be paid to any person or body of persons whose railroad or plant may be taken possession of in pursuance of this section, out of the moneys to be provided by Parliament, such full compensation for any loss or injury they may have sustained by the exercise of the powers of the Secretary of State under this section as may be agreed upon between the said Secretary of State and the said person or body of persons, or, in the case of difference, may be settled by arbitration in manner provided by 'The Lands Clauses Consolidation Act, 1845.'

"Where any railroad or plant is taken possession of in the name or on behalf of Her Majesty in pursuance of this section, all contracts and engagements between the person or body of persons whose railroad is so taken possession of and the Directors, officers and servants of such person or body of persons, or between such person or body of persons and any other persons in relation to the working or maintenance of the railroad, or in relation to the supply or working of the plant of such railroad, which would, if such possession had not been taken, have been enforceable by or against the said person or body of persons, shall during the continuance of such possession be enforceable by or against Her Majesty.

"For the purposes of this section 'railroad' shall include any tramway, whether worked by animal or mechanical power, or partly in one way and partly in the other, and any stations, works or accommodation belonging to or required for the working of such railroad or tramway."

The emergency having arisen the following announcement was issued from the War Office, dated August 4th : "An Order in Council has been made under Section 16 of the Regulation of the Forces Act, 1871, declaring that it is expedient that the Government should have control over the railroads in Great Britain. This control will be exercised through an executive committee composed of general managers of railways which has been formed for some time and has prepared plans with a view to facilitating the working of these provisions of the Act.

"Although the railway facilities for other than Naval and Military purposes may for a time be somewhat restricted, the effects of the use of the powers under this Act will be to co-ordinate the demands on the railways of the civil community with those necessary to meet the special requirements of the Naval and Military Authorities. More normal conditions will in due course be restored and it is hoped that the public will recognize the necessity for the special conditions and will in the general interest accommodate themselves to the inconvenience involved."

* * *

Railways Executive Committee.

ALTHOUGH technically taken over by the Government, the Railways are administered by a Committee of General Managers, and the following is the notification issued by Mr. H. A. Walker, Acting Chairman of the Executive Committee : "The control of the railways has been taken over by the Government for the purpose of ensuring that the railways, locomotives, rolling stock, and staff shall be used as one complete unit in the best interests of the State for the movement of troops, stores, and food supplies.

"The necessity for this action must at once become apparent when it is realised that certain

Digitized by Google

ports, through which the bulk of our food supplies enter this country, may be closed for the purpose of such food supplies, and, in that event, the rolling stock, locomotives, etc., may have to be diverted to other lines for the purpose of serving other ports.

"The staff on each railway will remain under the same control as heretofore, and will receive their instructions through the same channels as in the past."

On behalf of the Government the control of all the railways in Great Britain has been vested in a committee composed of the following general managers :—

Mr. D. A. Matheson, General Manager Caledonian Railway.
Sir Sam Fay, General Manager Great Central Railway.
Mr. C. H. Dent, General Manager Great Northern Railway.
Mr. F. Potter, General Manager Great Western Railway.
Sir Robert Turnbull, General Manager London and North Western Railway.
Mr. J. A. F. Aspinall, General Manager Lancashire and Yorkshire Railway.
Mr. H. A. Walker, General Manager London and South Western Railway.
Sir Guy Granet, General Manager Midland Railway.
Sir Alexander K. Butterworth, General Manager North Eastern Railway.
Mr. F. H. Dent, General Manager South Eastern and Chatham Railway.

"The official chairman of this committee is the President of the Board of Trade, and the acting chairman is Mr. H. A. Walker, general manager of the London and South Western Railway. The railway secretary to the committee is Mr. Gilbert S. Szlumper.

"We are officially advised that in order to give due effect to the instructions received from the War Office and Admiralty for the movement of troops, etc., it may be necessary to discontinue at short notice a portion of the advertised service, or to close certain of the lines against ordinary traffic. Under these circumstances no responsibility can be accepted for any delay or loss that may arise."

At a subsequent date Mr. W. Forbes, General Manager, London, Brighton and South Coast Railway, was added to the Committee, and for a time Mr. A. Watson, Superintendent of the Line, Lancashire and Yorkshire Railway, represents Mr. J. A. F. Aspinall, General Manager.

* * *

What the Railways have been doing.

One of the most remarkable features—a decidedly commendable one under the circumstances—is the fact that the public, as a whole, has seen little of what has been going on. Indeed, on one or two railways there was little indication of anything abnormal until the mobilisation of the Navy and of the regular forces had been completed, and it was only when the Territorial and reserve contingents came to be dealt with, and then largely owing to the development of other factors, that the general public began to realise what feats of transport were being carried out, largely by night, but also while dealing with a great deal of ordinary traffic. The London and South Western, South Eastern and Chatham and London, Brighton and South Coast Railways probably had the hardest conditions to contend with, as serving Portsmouth, Aldershot, Chatham, Dover and other centres immediately concerned in the heaviest pressure. The two former lines were therefore the first to seriously modify their usual arrangements, the South Eastern and Chatham being further complicated by the general dislocation of the Continental services *viâ* Dover, Folkestone and Queenborough. The London, Brighton and South Coast, Great Eastern and London and South Western Railways were also concerned in the Continental traffic disorganisation ; while in the north the Great Central, North Eastern and Lancashire and Yorkshire Railways were almost as severely affected by the abnormal conditions introduced at Grimsby, Hull, Immingham and Goole.

A few days after war was declared many railways cancelled all or most of their cheap ticket facilities, including even tourist tickets, and leaving only workmen's rates in the industrial areas and a few special arrangements such as combined rail and admission tickets, and some of the short distance "Country Ramble" facilities. There were, however, notable exceptions, and it is specially noteworthy how far certain railways, particularly the Great Eastern and Great Northern, were able to maintain a large proportion of holiday and excursion facilities. Later, many lines have reintroduced some of these special facilities. All companies, however, gave notice that trains might be altered or even suspended without notice. In many cases notices of alterations were given by manuscript announcements at stations ; but where they were extensive posters were published.

In due course ordinary trains were cancelled and re-arranged to meet conditions as they arose ; but this was partly accounted for by the fact that holiday makers largely ceased to require to travel to seaside resorts, though at times the pressure on the return trains was very heavy, owing to the premature return of many of those already on holiday, either enforced or because considered desirable. As showing the extent to which normal conditions were maintained in the country, after the few first days many people took their holidays more or less as usual, and the railways fostered this tendency as far as possible, though in most cases "luggage in advance" and "carted luggage" had to be discontinued, mainly owing to the shortage of horses, so many of them being taken for Government purposes. It is probable, however, that the goods traffic has suffered more than the ordinary passenger traffic ; but this was inevitable under the circumstances, though it will right itself in due course as military requirements permit.

Digitized by Google

Railway Ports and Steamers.

It is not only in conjunction with rail transport, however, that the railways have figured so prominently. Although most of the regular steamship services have been suspended or modified, the railway ports and steamers have been largely engaged in military transport, and the fact that so many of the modern boats are fast turbine or twin-screw steamers has rendered them valuable adjuncts at this period. Some of them are still concerned in the remains of the Continental traffic *viâ* Folkestone, Newhaven and Southampton; but the remainder are busily engaged on military duties, no one outside informed circles knowing how or where, so admirable has been the secrecy maintained by the Government and the press as regards such details. Similarly, the railway docks and harbours on the east coast are largely monopolised for military purposes, their up-to-date equipment, large capacity and extensive coaling accommodation rendering them peculiarly suitable in such emergencies.

* * *

Continental Traffic.

On Tuesday, August 4th, it was notified that the cross-channel services between Dover and Calais had been suspended, all traffic passing *viâ* Folkestone. Several changes were made but eventually the services settled down to 8.30 a.m. and 2.5 p.m. from London for Paris *viâ* Boulogne and for Ostend, with corresponding day return services only. The Flushing service leaves Victoria at 10 a.m. All luggage registered to places beyond Boulogne, Ostend, or Flushing is accepted only at owner's risk. The London, Brighton and South Coast Railway service, *viâ* Newhaven and Dieppe, are suspended until further notice, with a provisional service from London to Dieppe, on Mondays, Wednesdays, and Fridays, leaving Victoria at 10 a.m., Newhaven Harbour 11.45 a.m., arriving at Dieppe about 3.30 p.m. The times, however, are liable to revision without notice. In consequence of the disorganised train service in France, no connections beyond Dieppe can be guaranteed. All the regular steamship services from Rotterdam to Grimsby, Hull, and Goole have been suspended. Two services a day are being provisionally run to and from Havre, also to St. Malo, but all the other London and South Western Railway services to and from the Continent are cancelled, including the Cherbourg sailings. The Great Eastern Railway Continental services are all suspended.

The Channel Islands, Fleetwood-Belfast, Liverpool - Belfast, Liverpool - Londonderry, and other steamer services were also discontinued or modified, though on the West Coast there was not the tension that existed on the East and South Coasts.

* * *

Other Phases.

Several other phases of the situation require to be placed on record. The Underground Electric Railways Company and the London General Omnibus Company announced at an early date that men in uniform, whether soldiers or sailors, if not in possession of the necessary Government warrants, are permitted to ride free on all railways, omnibuses, and trams of the undermentioned companies: *Railways:* Metropolitan District, London Electric, Central London, City and South London. *Omnibuses:* London General, London Electric Tramways, Tillings, Gearless, Associated Southern, British, Central Metropolitan. *Tramways:* London United, Metropolitan Electric, South Metropolitan. A number of motor omnibuses were taken over by the Government.

During the week the police made an inspection of the disused City and South London Railway tunnel between the Borough and King William Street. A careful search was made for arms and other munitions of war, and both ends of the tunnel were subsequently closed up.

A feature of the situation during the week commencing August Bank Holiday was the suspension of banking in order to enable financial difficulties to be adjusted, the banks being closed that week until Friday morning. The following notice was issued on behalf of American tourists placed in difficulties because of this by Mr. H. W. Thornton, General Manager, Great Eastern Railway:

"The Company, having for some years enjoyed the patronage of many Americans travelling to the Continent by its route from Harwich to the Hook of Holland and Antwerp, desires to provide such assistance as lies within its power to American citizens who may be under temporary embarrassment pending the reopening of the banks on 7 August. In these circumstances, the Great Eastern Railway Company will cash express companies' cheques, travellers' cheques, and similar paper from 10.30 a.m. to 3.30 p.m. on 4, 5, and 6 August at their Continental Office, Liverpool Street Station, City. No private cheques will be cashed, and on account of the limited supply of currency no more than £10 can be given to any individual. The Great Eastern Railway Company reserves the right to cancel or alter this arrangement without notice, and relies upon the co-operation of those whom the arrangement is intended to assist to prevent its abuse."

This courtesy was greatly appreciated. For the benefit of American visitors desiring to return to the United States, several additional vessels were chartered, and the London and North Western Railway ran special trains in connection therewith. We may also mention the adventurous journey to Zeebrugge made by the Lancashire and Yorkshire Railway steamer *Duke of Cornwall* in order to bring back tourists stranded in Belgium.

* * *

Railwaymen called up for Service.

It is estimated that railway men to the number of over 20,000 have left their employment in obedience to mobilisation orders, and the vacancies are being filled by giving men of the lower grades a "step up," or taking on new men for the less skilled occupations. As far as possible the companies will keep posts open for the men

Digitized by Google

who return to civil life when the war ends. Details of the numbers leaving each company are not yet available, but on two systems over 1,400 men have been called up to join the Reserves and Territorials, on another, 1,200, and others are still liable for duty later. Among the thousands of workers on the Underground Electric Railways' group some 2,500 men were called out. It is too early for an official statement of the arrangements which the railway companies will make in regard to those of their employés who have to leave their work in the defence of the Empire, and for the care of the families of any who may be killed or permanently injured in the discharge of their duties, but in most cases it has been made known that the companies will act very generously in this respect. Many employers of labour have decided to pay whole or half wages to Reservists and Territorials who have been called up, to pay allowances to wives and children, and to keep situations open.

* * *

Engineer and Railway Staff Corps.

HITHERTO this Corps has been little more than a name as far as the general public is concerned; though behind the scenes it has been responsible for many of the arrangements which have now been carried out. It was formed in 1865, for the purpose of directing the application of skilled labour and of railway transport to the purposes of national defence, and for preparing, in time of peace, a system on which such duties should be conducted. In 1908 it became part of the Royal Engineers of the Territorial Force, but it did not come under the control of the County Association, being administered directly by the War Office. Its purpose is now being carried out by the Committee of Managers who have the control, on behalf of the Government, of all the railways in the United Kingdom. All the members of the Committee mentioned above, with the exception of Sir Alexander K. Butterworth, are Lieutenant-Colonels in this corps.

Its probable working, which agrees closely with the arrangements now made, was anticipated by the late Sir George Findlay, in a lecture delivered by him in 1888. A few of his remarks may be quoted:

"The writer's view is that in time of war, when, in accordance with the provisions of the National Defence Act of 1888, the railway companies may be called upon by the Secretary of State for War to suspend, so far as may be necessary, the ordinary traffic, and to devote the railways, in priority, to military purposes, the principal railway officials should become, for the time being, the servants of the State, and the railways should be worked and controlled, under the direction of the Headquarters Staff by the officers of the Engineer and Railway Staff Corps, who are the managers of the leading railway companies; that is to say, that the Headquarters Staff would instruct them as to the transport required, and they would be responsible for providing it. The smaller railways should, for the time being, for all purposes connected with military transport, be affiliated to the other leading railways whose managers are Lieutenant-Colonels of the Railway Staff Corps, so that in fact all the railways of the country would be divided into a certain number of groups or sections, each of which would be under the direct management of an officer of the Railway Staff Corps, these officers in turn acting in conjunction with the Council of the Corps. Each officer in charge of a group should be able to requisition stock, if required, from any of the other groups or sections; but this should be done through the medium of the Council, whose business it would be, with a full knowledge of the operations contemplated, and their extent, to regulate the distribution and supply of rolling stock throughout the area affected. As to the payment ultimately to be made by the companies for the use of stock other than their own, the Railway Clearing House already provides complete machinery for keeping an account and arranging for payment as between one company and another on a system of mileage charges."

According to the July Army List the following well-known railway officers hold commissions in this corps: *Lt.-Col. Commandant*: W. Forbes (L.B.S.C.R.); *Lt.-Cols.*: J. A. F. Aspinall, Sir Sam Fay, A. Ross, D. Cooper, C. H. Dent, Sir Guy Granet, C. S. Denniss, W. B. Worthington, D. A. Matheson, F. H. Dent, H. A. Walker, F. Potter, C. L. Morgan, E. C. Geddes, E. A. Neale, C. A. Harrison, Sir Robert Turnbull, S. Williamson; *Majors*: P. C. Tempest, D. C. Rattray, E. D. Jones, H. Holmes, F. F. Scott, W. J. Grinling, E. F. C. Trench, H. A. Watson, H. Jones, H. S. Wainwright, W. Clow, W. A. Paterson, L. P. Nott, F. G. Randall, C. Aldington, E. C. Cox, J. B. Ball, W. W. Grierson, C. J. Brown, and A. W. Szlumper. Besides these gentlemen, several railway contractors and engineers in private practice are also members.

* * *

Mileage and Rolling Stock Statistics.

FOR several decades it has been realised that in the next great war the railways would be the most important factors on land; and comprehensive plans have been made on this basis in every European country. Indeed, in many cases military considerations have affected, if they have not directly controlled, the construction of railways and connecting lines, including not only recognised "strategical" sections, but also branches concerning which strategical value has never been acknowledged or realised by the general public. It will therefore be of interest to review some of the railway mileage and rolling stock statistics concerning the countries now concerned. These have been compiled from many different sources, and are slightly approximate, but sufficiently accurate for general reference.

Digitized by Google

	Mileage.	No. of Locos.	No. of Carriages.	No. of Wagons.
United Kingdom	23,718	22,998	72,888	780,520
France	31,200	14,500	33,500	364,000
Russia	45,350	17,200	20,000	370,000
Belgium	5,370	4,300	10,000	90,000
Germany	38,950	28,000	60,000	600,000
Austria-Hungary	28,400	10,000	21,000	245,000
Servia	582	163	411	4,933

In succeeding paragraphs the railway systems of these countries are discussed in greater detail.

Home Railways.

A PRELIMINARY summary of the railway returns for 1913, issued recently by the Board of Trade, enables the principal statistics affecting the home railways to be reviewed on a more up-to-date basis than would otherwise be the case. Authorised capital is now given as £1,421,848,000, of which £1,343,884,000 is paid-up. Of the latter amount £199,447,000 consists of nominal additions. Train mileage during the year is given as 435,346,000, while shunting mileage was 137,830,000 and light and miscellaneous mileage 54,603,000, realising a total engine mileage of 627,779,000. Revenue is made up of £56,929,000 from passenger train traffic, £66,617,000 from the carriage of merchandise, minerals and live stock, £1,204,000 from miscellaneous traffic, and £14,503,000 from other sources than railway working, making a grand total of £139,253,000. Working expenditure consists of £78,803,000 on railways and £8,439,000 spent in other ways, the total of £87,242,000 leaving a net increase of £52,011,000, representing a return of 3·87 per cent. on the total paid-up capital, including nominal additions.

Owing to essential differences in the methods of compiling the returns now in force it is virtually impossible to compare the 1913 statistics with those of 1912 and previous years, so that it will be simpliest to tabulate the principal figures of interest as now stated by the Board of Trade:

	£
Passenger receipts	42,232,000
Season tickets	4,864,000
Mails, parcels, etc.	9,833,000
Merchandise receipts	32,978,000
Coal, coke, etc.	22,903,000
Other minerals	9,061,000
Live stock	1,675,000
Passenger road vehicles	125,000
Steamboats	2,579,000
Docks, harbours, etc.	3,734,000
Hotels, refreshment rooms, etc. ..	3,195,000
Canals	1,101,000

Under passenger traffic, first-class tickets produced £3,761,000, second-class £1,086,000, and third-class £35,711,000, while the conveyance of workmen realised £1,678,000 or 1.565d. per head.

The following general statistics will also be of interest, without comment:

Mileage open for traffic.	Miles.
Running lines—First track ..	23,718
,, Second track ..	13,398
,, Third track ..	1,619
,, Fourth track ..	1,255
,, Over 4 tracks ..	699
Sidings reduced to single track ..	14,749
Total of single track, including sidings	55,438

Number of passengers (calculated on single journey basis) exclusive of season ticket-holders.	Numbers.
Ordinary—1st class	26,025,000
,, 2nd class	12,088,000
,, 3rd class	933,498,000
Workmen	256,705,000
Total	1,228,316,000
Holders of season tickets (calculated on annual basis) ..	595,000
Tonnage of goods and mineral conveyed.	Tons.
General merchandise	72,879,000
Coal, coke, and patent fuel ..	226,528,000
Other minerals	72,164,000
Total	371,571,000

* * *

French Railways.

ALTHOUGH details of French and other European railways are not available on a similarly prepared basis, a few facts in reference thereto can be given. There are five great French companies, named from the districts they serve, and a State system consisting of the Western line bought up a few years ago and linked on to the small State system previously existing. Even the private lines are, however, associated with the State, in the sense that the permanent way and fixed plant are, broadly speaking, provided by the Government, or constructed by the companies by arrangement with the State; and the superstructures and equipment of the stations, provision of locomotives and rolling stock, and the working of traffic rest with the private companies. Arrangements vary considerably, and State guarantees, State assistance, with restrictions and special obligations on the other side, complicate the situation,

Digitized by Google

so that the position of the private companies, is vastly different from that of our own railways. There are, consequently, very few alternative main routes, each system having a virtual monopoly of its own area; while the network of branch lines is designed to meet the needs of the country and with a view to military requirements, rather than for purposes of traffic competition or aspects which figure so largely in our own railway economy.

The State system consisted originally only of a series of more or less unprofitable lines, taken over to save them from bankruptcy; but in 1908 the Western system, which had had to fall back upon State assistance to a serious degree, was bought up on the terms specified in the concessions, so that the State system is now the second longest in the Republic. There are also many local lines, serving as feeders to the main lines or meeting the needs of particular districts. Some of these are normal gauge, but the majority are narrow gauge.

According to recent returns, the State system consists of 8,982 kilometres of track, and the rolling stock and transport material comprises 2,661 locomotives, 6,403 carriages, 55,056 goods vehicles, 3 passenger steamers, 6 cargo steamers, 6 motor-cars, 15 motor-wagons, 595 vans and 919 horses. On the Eastern line (5,027 kilometres), 1,793 locomotives, 1,517 tenders, 4,045 carriages, 2,384 vans, and 52,009 wagons are employed. The Northern system of 4,010 kilometres is operated with 2,350 locomotives, 5,354 carriages, 3,993 express wagons, 76,318 ordinary wagons, and two steamers. The Orleans Company operates 7,467 kilometres, and the rolling stock consists of 1,973 locomotives, 18 rail motor-cars, 4,893 carriages, and 44,529 wagons.

The P.L.M. Company is the largest, with 9,692 kilometres (also 513 kilometres in Algiers) of line, 3,432 locomotives, 3,061 tenders, 6,908 carriages, 101,027 wagons, 273 electric vehicles, and 18 steam rail motor-cars. The Southern (Midi) system consists of 4,080 kilometres, operated by 1,061 locomotives, 2,827 carriages, and 30,307 wagons. Miscellaneous smaller companies, including the Paris "Metro," add 478 kilometres, while of the light and local lines there are 2,565 kilometres of normal gauge and 8,644 kilometres narrow gauge.

For further information we may refer readers to Lord Monkswell's book on "French Railways." Copies can be had from the offices of the RAILWAY MAGAZINE. Price 6s., post free 6s. 4d.

* * *

French Railways in War Time.

FRENCH railways are subject to a general law authorising requisitions for the necessities of national defence. In addition to this, however, the large part railways are called to play in times of war has led to the organisation of a permanent department to prepare them for use in times of war.

No railway may be constructed in France until the Minister of War has been consulted and his approval obtained.

Many French railways built since the war of 1870 have been constructed for purely strategical purposes, and certain lines built on the demand of the War Minister are capable of carrying a far greater volume of traffic than is ever likely to be conveyed over them for commercial purposes.

Railway lines and works executed solely for military purposes are paid for by the French Government.

A special department of the general staff enquires into and studies the utilisation of the railway lines and rolling stock in time of war. The necessary inquiries and studies are conducted for each large company by a technical commissioner, who is usually the manager of the company, and a military commissioner belonging to the general staff. In time of war the Minister of War has all railways under his supreme control. No passengers or goods may be conveyed without his consent. France is divided into three zones for this purpose. In the interior zone transportation is regulated by the Minister and effected by the usual means and controlled by Commissions, Sub-Commissions, and Station Commissions composed of one officer and one railway official. In the zone in which the Army is operating the organisation is the same, but under the direct orders of the Commander-in-Chief. The zone beyond the base of operations is ensured in the same manner by Commissions who employ sappers of the railway regiment and railway servants under the obligation of performing military service.

* * *

Belgian Railways.

HERE the railways are largely owned by the State, and the Government network of lines, aggregating 4,369 kilometres, ranks as a very important factor in the industrial development of this small but enterprising country. There are 4,288 locomotives, 34 motor vehicles, 8,010 carriages, 3,380 brake vans, and 87,349 good vehicles. There is also the Nord-Belge system of 170 kilometres owned by the Northern Railway of France, and about 200 kilometres of smaller lines, with the 4,107 kilometres by which the National Light Railway system meets the needs of the country in all directions. The State system also owns the steamers engaged in the Dover-Ostend service, the *Princess Elizabeth*, *Jan Breydel*, *Pieter de Coninck*, *Stad Antwerpen* and *Ville de Liége*, being good examples of turbine practice, the last two being quite new vessels. We may also refer to a comprehensive article contributed by Mr. W. Parker, Manager, of the Railway Magazine, and President of the Railway Club, to the recently published "Modern Railway Working," also to illustrated articles dealing with the Belgian State Railways published in the RAILWAY MAGAZINE for December, 1911 and January and February, 1912.

* * *

Russian Railways.

A LARGE proportion of the railway system is owned by the State, the gauge being usually 5 ft., so that through running of vehicles with other European systems is impossible in most cases. The State lines are divided into local

Digitized by Google

administrations as follows :—(1) *Alexandre*, 1,091 kilometres, 469 locomotives, 622 carriages, 6,541 wagons ; (2) *Baskountschak*, 51 miles, 17 locomotives, 11 carriages, 672 wagons ; (3) *Catherine*, 2,997 kilometres, 1,395 locomotives, 949 carriages, 36,866 wagons ; (4) *Libau-Romny*, 833 miles, 440 locomotives, 460 carriages, 11,598 wagons ; (5) *Moscow-Koursk-Nishni*, 1,326 miles, 663 locomotives, 1,139 carriages, 14,105 wagons ; (6) *Nicolas*, 1,856 kilometres, 660 locomotives, 1,634 carriages, 19,556 wagons ; (7) *North Western*, 2,716 kilometres, 952 locomotives, 1,493 carriages, 14,156 wagons ; (8) *Northern*, 2,296 kilometres ; (9) *Perme*, 2,350 kilometres, 263 locomotives, 347 carriages, 5,791 wagons ; (10) *Polessie*, 2,013 kilometres, 369 locomotives, 542 carriages, 9,140 wagons ; (11) *Privislynskyia*, 2,140 kilometres, 897 locomotives, 1,163 carriages, 18,873 wagons ; (12) *Riga-Orel*, 749 miles, 442 locomotives, 541 carriages, 10,709 wagons ; (13) *Samara-Zlatoust*, 793 miles (5 ft.), 54 miles (metre gauge), 580 locomotives, 1,546 carriages, 14,570 wagons ; (14) *Southern*, 3,072 kilometres, 1,309 locomotives, 1,880 carriages, 35,453 wagons ; (15) *South-Western*, 4,395 kilometres, 1,257 locomotives, 1,429 carriages, 27,446 wagons ; (16) *Syzran-Viazma*, 865 miles, 479 locomotives, 545 carriages, 10,536 wagons ; (17) *Transcaucasian*, 1,806 kilometres, 611 locomotives, 550 carriages, 13,809 wagons ; (18) *Warsaw-Vienna* ; (19) *Finland State*, 3,553 kilometres, 503 locomotives, 1,228 carriages, 14,906 wagons. Among the private companies, however, several are of considerable size, and the following may be specially mentioned :—(1) *Moscow-Kieff-Voroneje*, 1,960 kilometres (5 ft.), 500 kilometres (metre), 540 locomotives, 497 carriages, 11,670 wagons ; (2) *Moscow-Kazan*, 2,597 kilometres, 540 locomotives, 700 carriages, 15,531 wagons ; (3) *Moscow-Windau-Rybinsk*, 2,462 kilometres (5 ft.), 168 kilometres (3 ft. 6 in.), 411 locomotives, 645 carriages, 12,854 wagons, 1 steamboat ; (4) *Riasein-Uralsk*, 3,803 kilometres (5 ft.), 590 kilometres (metre), 871 locomotives, 942 carriages, 19,372 wagons, 3,310 oil tank wagons ; (5) *South Eastern*, 3,469 kilometres, 935 locomotives, 1,131 carriages, 21,487 wagons, 1,001 oil tank wagons ; (6) *Vladicaucase*, 2,599 kilometres, 797 locomotives, 970 carriages, 17,039 wagons, 2,416 oil tank wagons, 4 steamboats. In Siberia there are also the Trans-Siberian (Russian State), with 2,082 miles, Trans-Baical, Oruscaja, and a few other lines.

* * *

German Railways.

In Germany the railways are under the supervision and control of the Imperial Government and certain governing principles pertaining to interconnection, military and other matters apply to all of them ; but the Federal States each maintain and control their own systems, except as far as they are co-ordinated by Imperial direction. By far the largest is the Prussian State system, which also operates the railways of the Grand-Duchy of Hesse, while the Alsace-Lorraine Railways (these actually belong to the Imperial Government) are also associated with the Prussian State administration. The other State systems are those of Bavaria, Saxony, Württemberg and the Grand-Duchies of Baden, Mecklenburg and Oldenburg. The private lines consist mainly of the Lübeck-Büschen Railway, and the Westphalian District Railway. Besides the standard railways there are also many "light" railways, largely owned by municipalities and local governments, in some cases with State aid.

The Prussian State system is divided into 21 administrative sections, and somewhat similar methods are adopted on other lines. There are few alternative main routes as in this country, but the whole of the German Empire is covered with a wonderful network of lines, and not a few sections have been constructed with a special view to military requirements, though the districts involved have also benefited.

Directly associated with the Imperial State Administration is the Alsace-Lorraine division (1,847 kilometres), with 11,071 locomotives, 2,290 carriages, 28,445 wagons, and 20 locomotives, 43 carriages and 196 wagons used on 78 kilometres of metre gauge track. Part of the Luxembourg Railways are also operated in conjunction with the Imperial lines, being associated with the Wilhelm-Luxembourg section (196 kilometres), worked by the Alsace-Lorraine Administration. A joint administration is provided for dealing with the Hessian lines in association with the Prussian system.

The various divisions of the Prussian State system are as follows :

Division.	Length. Kilom.	Locos.	Car.	Wagons.
Altona ..	1,992	1,280	2,910	18,530
Berlin ..	670	845	3,829	10,660
Breslau ..	2,291	1,277	3,304	*
Bromberg ..	2,196	—	—	—
Cassel ..	1,998	1,150	1,519	14,795
Cologne ..	18,730	1,246	2,750	44,558
Dantzig ..	2,613	724	1,505	8,914
Elberfeld ..	1,451	1,279	2,250	*
Erfurt ..	1,993	942	1,948	7,939
Essen ..	1,167	1,733	2,062	*
Frankfurt ..	1,969	1,020	3,000	7,100
Halle ..	2,099	1,064	2,447	4,691
Hanover ..	2,200	1,370	2,300	40,000
Kattowitz ..	1,589	1,029	1,677	14,170
Königsberg ..	2,939	600	1,195	*
Magdeburg ..	1,702	927	2,258	*
Mainz ..	1,161	Prussian & Hessian Joint.		
Münster ..	1,470	788	1,100	3,874
Posen ..	2,627	811	1,730	13,400
Saarbrücken ..	1,199	680	1,604	3,664
Stettin ..	2,207	837	2,600	2,262

* Wagons supplied by the Central Administration.

With this administration are also associated the Royal Prussian Military lines, with 70 kilometres, 18 locomotives, 32 carriages, 253 wagons and 1 steam car.

Baden has 1,783 kilometres of railway, with 838 locomotives, 2,257 carriages, 21,867 wagons and 8 steamboats. Bavaria has 8,140 kilometres, 2,405 locomotives, 7,037 carriages, 25 motor-carriages, 53,421 wagons, 11 steamboats and 11

Digitized by Google

tug-boats, while for 115 kilometres of metre gauge railway there are 28 locomotives, 141 carriages and 287 wagons. On the Mecklenburg lines (1,094 kilometres) there are 207 locomotives, 435 carriages and 3,677 wagons. The Oldenburg State lines (704 kilometres), are worked with 211 locomotives, 404 carriages, 4,630 wagons, 2 steamboats and 1 motor car. Saxony has 2,861 kilometres of standard gauge and 505 kilometres of narrow gauge. There are 1,637 locomotives, 4,670 carriages, 45,360 wagons and 2 motor cars. Württemberg has 1,997 kilometres standard gauge and 86 kilometres narrow gauge. There are 840 locomotives, 2,943 carriages, 13,263 wagons, and 8 steamboats.

* * *

Austro-Hungarian Railways.

STATE Railways in the twin empire are partly owned by the Government and partly worked by the State administrations on behalf of the proprietors. The Imperial Austrian Administration has control of 19,255 kilometres, using 6,192 locomotives, 11,955 carriages and 116,358 wagons. There are also many small systems in Austria, or associated therewith, and a few of fair size, such as the Aussig-Teplitz (253 kilometres), Bosnia-Hertzegovinian State (935 kilometres), Bukswina (222 kilometres), Buschtehrader (484 kilometres), Kaschau-Oderberg (471 kilometres), Lemberg-Suczana (357 kilometres). The Southern Railway is the only really big line besides the State system. This has 2,220 kilometres of line, 1,004 locomotives, 2,189 carriages, and 17,733 wagons.

Hungarian State Railways include 18,308 kilometres, standard gauge, and about 600 kilometres narrow gauge. There are 3,809 locomotives, 8,057 carriages and 88,254 wagons. Of the private lines the most important are the Avad-Csanad (380 kilometres), Kassa-Oderberg (471 kilometres), and Szamos Valley (255 kilometres) railways.

* * *

Other Railways Concerned

BEARING in mind that the present war originated in the outbreak of hostilities between Austria and Servia, it appears somewhat incongruous, in view of the notable statistics reviewed above in reference to the railways of countries now involved, to record that the State Railway system of Servia includes 940 kilometres of standard gauge, and 476 kilometres of 2 ft. 6 in. gauge, while the total locomotive stock consists of 163 engines, with 411 carriages and 4,933 wagons.

As regards other countries we may mention that besides the Luxembourg lines worked by the Prussian State Administration, there is also the Prince Henry system of 598 kilometres standard gauge, 387 kilometres of metre gauge and 265 kilometres of 2 ft. 6 in. gauge. There are 70 locomotives, 95 carriages and 2,733 wagons. This system of lines is largely concerned with the development of the mineral resources of the district.

* * *

Great Eastern Railway Hospital Train.

BY the courtesy of Mr. A. J. Hill, Locomotive Superintendent, Great Eastern Railway, we are able to present on the next page a diagram of the hospital train equipped by that company, in view of the large number of invalided soldiers and sailors they may be expected to convey from the East Coast ports. There are nine vehicles, all adapted from ordinary main line vehicles hitherto in service, the whole constituting an interesting example of what can be done at relatively short notice and by utilising material conveniently available. The following particulars of the alterations involved and the equipment provided will be of interest, dealing with the vehicles in order :—

(1) This is a 50 ft. brake corridor composite coach. The guard's compartment is converted into a mess-room with table and four armchairs. One of the first-class compartments is fitted with beds made up on the seats for two nurses, and the other similarly accommodates two doctors. One of the thirds has the seats removed and is converted into a pantry, while another similarly becomes a stores. The centre third is for two men in attendance, also with beds on the seats.

(2) Originally a brake third, the whole of the internal work, except the lavatory, is removed. One division now accommodates four beds, two at each side, one above another, for officers, and the remaining space holds eight beds on each side, constituting a ward for 16 men. One pair of double doors for luggage are retained on each side so as to enable invalids to be brought in on stretchers, the other pairs being locked.

(3) This was a similar vehicle, but the whole of the ward space is open, with 20 beds.

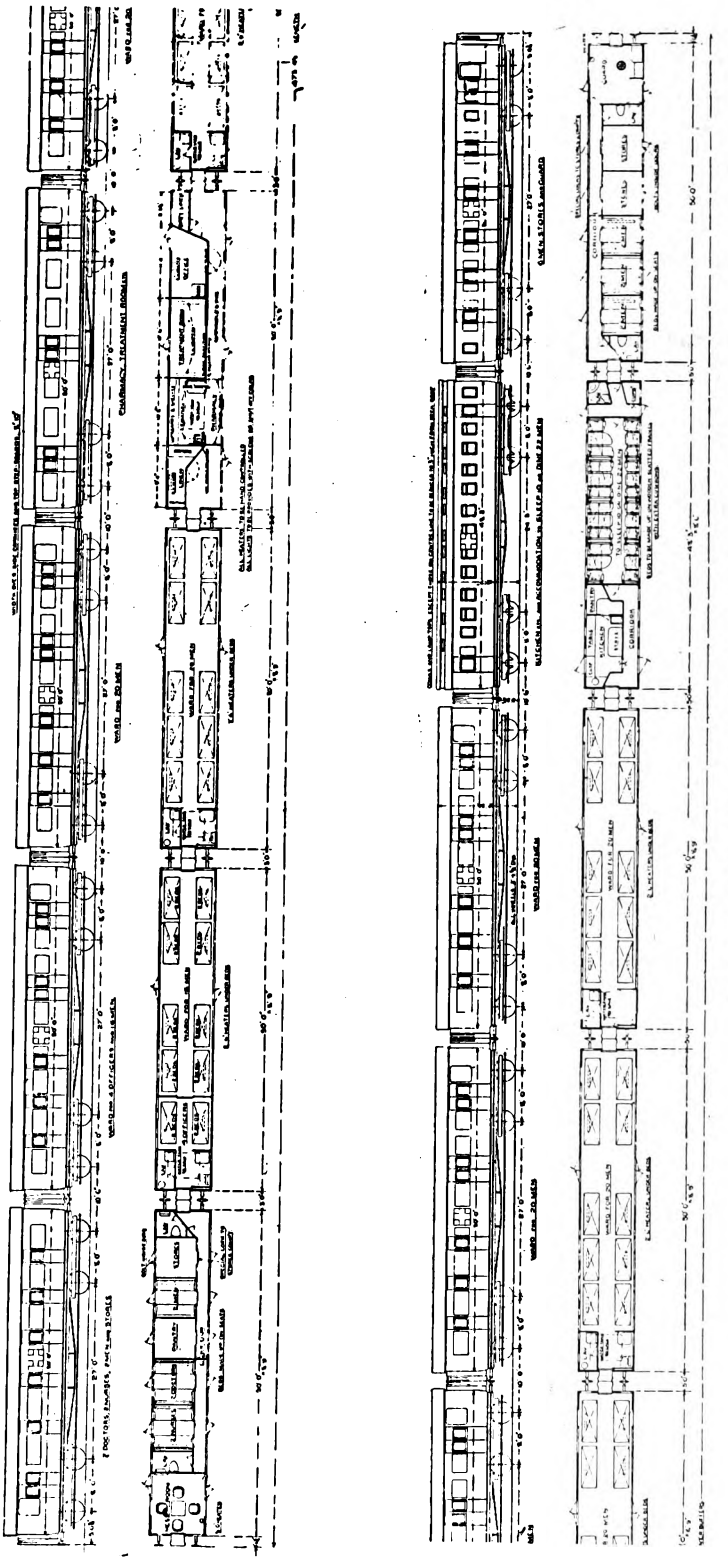
(4) This was originally a guard's and luggage van, so that very little had to be removed. At one end is a linen store and at the other end a compartment for dirty linen. Next the latter is the office, with safe and desks, while the remaining space is utilised for a treatment room (sliding partition to corridor) and a pharmacy.

(5, 6 and 7) These are similar to No. 3, and adapted in the same way.

(8) This was a first-class dining car, with kitchen, but is fitted with removable tables and seats as used in third-class dining cars, so that 22 instead of 16 seats are available, and adapted so that if required beds can be made up on wooden slatted frames with extra cushions, and ten men accommodated.

(9) This was a vehicle similar to No, 1, but the two first-class compartments are converted into stores divisions, while the thirds each accommodate two men, with beds made up on the seats. The guard's compartment is retained, as this w be the rear of the train.

Digitized by Google



GREAT EASTERN RAILWAY AMBULANCE TRAIN.

Constituted by the adaptation of existing vehicles, under the direction of Mr. A. J. Hill, Locomotive Carriage and Wagon Superintendent.

Digitized by Google

All vehicles are of 50 ft. bogie classes, except the dining car, which is 48 ft. 3 in. long over body, and the train is vestibuled from end to end. The dining car has a clerestory roof, others having elliptical roofs. Nos. 2, 3, 4, 5, 6 and 7 are supplied with large capacity water tanks, and heaters under the beds and elsewhere, and other equipment is added as required. The stores compartments have special locks to the doors, and where necessary original doors which are not now required are permanently locked.

* * *

Locomotive Men and Electrification.

THE fact that only one man is required at the front of each train and that a motorman's position is very different from that of a steam locomotive driver, has caused considerable heart-burning where electrification is proceeding, though on the lines already converted the directors have usually dealt very fairly with the men affected. On the London, Brighton and South Coast Railway the following memorandum of agreement was recently signed by Lord Bessborough :

"London Bridge Offices, 24 July, 1914.

"Locomotive men who were in the service on 1 July, 1914, as long as such are available, shall have exclusive option to fill motor-driver's position.—(Signed) BESSBOROUGH."

In the case of the London and South Western Railway, the arrangement come to with the steam drivers respecting the appointment of motormen for the new electric service is as follows : (1) All steam drivers displaced by the introduction of electric traction to have the first chance of qualifying for the position of motormen. (2) After provision has been made for drivers displaced, the position of any other motormen required at the initial stages of the electrification to be offered to steam drivers throughout the system. (3) It has also been agreed that any driver who is transferred from steam locomotives to the position of motorman shall receive not less than the rate of pay he was receiving at the time of taking up such appointment. (4) The men have also been promised that the position of regular motorman will not be available to any other grade in the service until every fireman and cleaner in the Company's employ on 31 December, 1914, has had an opportunity of qualifying for the post. (5) After the men referred to in the last paragraph have been dealt with, the position of motorman will be open to any man in the service who may be available and suitable."

Railway Clearing House Announcements.

To some extent the Railway Clearing House is issuing standard notices in reference to railway arrangements on behalf of the Executive Committee. The following may be quoted, dated August 8th :—

(1) Notice is hereby given that in consequence of the European war crisis the regular passenger train and boat services usually run by the railway companies may be considerably curtailed or interrupted, and that traffic can only be accepted as it can be dealt with, and then only on the understanding that responsibility will not be accepted for any delay, damage, or loss which may arise through any such curtailment or interruption.—By order of the Executive Committee.

(2) The public are hereby informed that until further notice all single journey and return tickets, also season tickets, are available by the trains of any railway running between the points for which the tickets are issued.—By order of the Executive Committee.

The following statement was issued by the Railway Executive Committee : "The railway companies have arranged to keep open positions for Reservists and Territorials who have joined the colours. The companies will also make allowance to the families during the time the men are absent from their homes, and will, when necessary, pay the subscription to the companies' superannuation and provident funds."

Most of the railway companies have also issued notices of similar character on their own behalf.

* * *

War Maps.

MESSRS. JOHN BARTHOLOMEW & Co., the well-known geographical experts, have issued a specially prepared general map showing the European frontiers, and a special large scale map showing the frontier regions between France, Germany, Belgium and Holland. These are beautifully printed in colours, size 23 in. by 36 in. Either can be obtained from the offices of the RAILWAY MAGAZINE, 30, Fetter Lane, London, E.C. Price 1s. paper, or 2s. mounted on cloth, post free 1s. 1d. and 2s. 2d.

* * *

Railwaymen's Convalescent Homes.

THE two Railwaymen's Convalescent Homes at Herne Bay and Leasowe Castle have been offered to the Government for the sick and injured in the war, and this offer has been accepted. Leasowe Castle, in Cheshire, is already in the hands of His Majesty's forces.

Digitized by Google

WHEN the London elementary schools "broke up" for the summer holidays, assembled on the platform of Waterloo station were to be seen a representative party of teachers—members of the National Union—awaiting with anxious anticipation their novel and much looked forward to ocean voyage and tour of Canada and the United States. The party, numbering about 40 persons (in charge of Mr. W. F. Goldstone, M.P.) were *en route* to Southampton, to embark per s.s. *Alaunia*, and on arrival at Montreal, proceeded in charge of the Grand Trunk Railway, *via* Ottawa, Algonquin Park, Muskoka Lakes, Toronto, Niagara Falls, Albany and New York, returning hence about the middle of August. Four or five years ago such a trip might at first thought be condemned by these same individuals, as waste of valuable holiday time; but ever since the London Teachers' Association party returned four years ago with such glowing tributes of beautiful, unthought of tourist scenery, comfortable accommodation (hotel, train, boarding houses, etc.), remarkable climate, exceptional boating, fishing, bathing possibilities, and Canadian hospitality, coupled with the opportunity of increasing their knowledge almost unknowingly, whilst thoroughly enjoying themselves, such a trip has become more or less general in teaching circles, and at least two or three parties are now formed annually with a similar object in view. Everyone must realise the value of travel from an educational point of view, and the work the Grand Trunk European Organisation is doing regularly in encouraging and promoting such knowledge of the Premier Overseas Dominion, especially amongst a class who guide the opinions and ideas of the coming generation to such an extent as do our teachers, is truly imperialistic.

* * *

IN view of the development of Thorpeness, near Aldeburgh, on the Suffolk coast, as a seaside bungalow township, the Great Eastern Railway has opened a halt for the use of passengers travelling to and from this resort. All trains running between Leiston and Aldeburgh, except the 6.40 p.m. train from Aldeburgh on week-days, calls at this halt to set down or pick up passengers.

A POINT in railway ticket law was recently dealt with at Whitehaven County Court. Edward Knowles claimed 4s. 3½d. from the Furness Railway, 4s. being for the cost of a conveyance from St. Bees to Whitehaven, and 3½d. the cost of a third-class ticket from St. Bees to Whitehaven. It appeared that on Sunday evening, June 14, plaintiff, being desirous to return by the last train from St. Bees to Whitehaven, took a ticket, but there was no room in the train except in the guard's van, which he was invited to enter, but at first refused. He changed his mind, however, and was making towards the van when the train moved off. His Honour, in giving judgment, said the plaintiff was entitled to refuse to get into the van, but when he changed his mind as the train was moving off, he thought the railway company's servants acted with great propriety in preventing him getting into the van then. If the company had entered into an unconditional contract to convey plaintiff and did not, no doubt he would be entitled to be carried home. But when the ticket was subject to certain conditions, and the company did all they reasonably could to bring these conditions to the notice of the passengers, there was no claim against the railway company. Therefore he gave judgment for the defendants with costs.

* * *

THE Australian Minister controlling the Northern Territory has placed before Parliament plans for the development of half a million square miles on the northern portion of the Commonwealth. The construction of the Pine Creek to Katherine River Railway is being undertaken, and a proposal will be submitted for railways through the Macdonnell Ranges to connect with Oodnadatta, and the Katherine River to connect with Newcastle Waters, or some other point on the trans-Australian Railway with the Queensland border at Camooweal or elsewhere, where the Great Western Railway of Queensland is in course of construction. Probably there will be a later project to link up Anthony's Lagoon on the branch line to Queensland with the Pellew Islands, at the mouth of the MacArthur River. The cost, with water, roads, etc., is set down at probably £10,000,000. The construction will be spread over about eight years. The contract system as far as possible will be adopted.

Digitized by Google

A COSTLY French railway is the new line, 18 miles long, from Moutiers to Bourg St. Maurice, at the foot of the Little St. Bernard Pass (Savoie), which was opened for traffic in November last, took about twelve years to build, and cost the Paris Lyons and Mediterranean Railway £1,083,228, or £60,177 per mile, a considerable increase on the original estimate of £398,040, or £22,113 per mile. A Foreign Office report points out that this relatively high cost is due to the mountainous nature of the country through which the line passes, necessitating a formidable amount of tunnelling and bridge building—there being no less than ten tunnels (one of them a "corkscrew" nearly a mile long) totalling more than 3 miles in all, and 125 bridges, culverts and watercourses, including five viaducts varying from 45 to 114 ft. in length. The line is single, and has a gauge of 4 ft. 9 in., and a maximum gradient of 1 in 50. There are five stations.

* * *

IT is expected that the Abyssinian Railway will reach the capital of Addis Abeba in February of next year. A correspondent of the *Kolnische Zeitung* at Addis Abeba states that the railway has already been completed to kilometre 312 (reckoned from Diredana) and kilometre 621 from Djibuti. But, as there is a scarcity of camels for the transport of materials from the terminus to the site of construction, the work is frequently interrupted, particularly in the mountainous district, where many bridges have to be erected and cuttings made. Nevertheless the section to the Modjo River, which is 73 kilometres from Addis Abeba, will presumably be finished next November, and as the foundations for the permanent way from Modjo to Addis Abeba have now nearly been completed, the first train is expected in the latter place at the beginning of February.

* * *

ACCORDING to the annual report on the Indian State Railways' coal department during 1913, 22,343 broad gauge wagons have been ordered for delivery to Indian railways by the end of 1915. Of these, 9,473 are for the East Indian and 1,845 for the Bengal-Nagpur, the two railways serving the Bengal coalfields. There was an increase in the imports of foreign coal (mainly British) into Bombay and Karachi during the year, due largely to a rise in sea freights on Bengal coal from Calcutta, though since the end of 1913 there has been a heavy drop in these freights. Exports of Indian coal have not increased since 1907, the average being about 3,000,000 tons per annum, of which the railways of India and Ceylon take one-third. This means that about 1,000,000 tons of Indian coal leaves Calcutta annually to be reimported through such ports as Rangoon, Madras, and Colombo, for the use of Indian and Ceylon railways, which, being far removed from the Bengal coalfields, find it cheaper to bring their coal by sea than by rail, though in the case of Rangoon (for the Burma Railways) the fuel has to come by water, there being no rail

CANINE TRAVELLERS TO THE CORNISH COAST.

connection yet between India and Burma. During the year, it is stated that there was an actual shortage in the country of coal of good quality.

* * *

A CIRCULAR issued by the Grand Trunk Pacific Railway announces the appointment of Mr. Louis Low, as Resident Manager of the Macdonald Hotel, Edmonton. This is the latest of the splendid hotels, which the Grand Trunk Pacific is providing for the travelling public in the Dominion, and the finishing touches are now being placed upon it. The site chosen for the hotel is possibly unequalled anywhere in Western Canada, for it combines convenience to the business centre, with a wonderful outlook over the valley of the Saskatchewan River. The building has been located on McDougall Street, almost at the crossing of Jasper Avenue and directly opposite the Edmonton Club. The site is ideal and the building was planned in such a manner as to take full advantage of the view across the beautiful ravine of the river, which bounds the entire southerly exposure of the property. Mr. Low, chosen as its Manager, is a practical hotel man of wide experience. He was formerly in the Chateau Laurier at Ottawa and has latterly been Assistant Manager of the Fort Garry Hotel, Winnipeg.

Digitized by Google

PREVIOUS to the outbreak of war the Hohenzollern Locomotive Works of Düsseldorf, Germany, were given an order for six powerful side-tank locomotives required for service on the dock lines of the Port of London Authority. It is understood that the question of delivery time did not determine the placing of this order, but that the prices quoted by several Continental engineers were considerably lower than those submitted by any British locomotive builders. In view of subsequent events the absence of a delivery time limit should be a consolation to the favoured firm.

* * *

IN connection with the National Relief Fund, of which the treasurer is H.R.H. The Prince of Wales, readers are referred to the coupon published in our advertising pages. This coupon should be filled in, and the envelope, which need not be stamped, addressed to H.R.H. The Prince of Wales, Buckingham Palace, London. Although the leading railways of Great Britain cannot under present conditions, make contributions on their own account, many railway Directors have given large sums to the Fund, and railway shareholders will naturally do their parts as private individuals. Amongst the donations to the Fund may be noted £1,000 from the Buenos Ayres Great Southern and the Buenos Ayres Western Railway Companies, and £500 from the Barsi Light Railway Company. The Argentine and other foreign railway companies with offices in London will, it is understood, make generous arrangements for those of their staffs who join the colours.

* * *

"DECOLITE" flooring, supplied by Messrs. Bell's United Asbestos Co., Ltd., is used for the new East Coast Joint kitchen cars described last month, as well as for the Pullman cars now running on the Caledonian Railway. On the North Eastern Railway this flooring is being used for other vehicles. In fact, "Decolite" is finding very considerable favour on most of the leading railways.

Railway Literature.

THE RAILWAY LIBRARY, 1913. Compiled and edited by Slason Thompson, Director of the Bureau of Railway News and Statistics, Chicago. [Published by the R. R. Donnelley & Sons Company, Chicago. Price 50 cents.] Like preceding volumes this is a collection of noteworthy addresses and papers dealing with selected subjects, with a comprehensive review of American Railway Statistics. Pride of place is given to extracts from the *Railway News* special Jubilee issue published at the end of last year to celebrate the fact that our old-standing contemporary had completed 50 years of continuous weekly publication. Other papers are mainly of American origin, but a few are based on material collected here. Railway conditions as they are, outlined in the testimony of President Samuel Rea of the Pennsylvania Railroad, find a place in this volume because his testimony sets forth conditions common to all progressive American railways. The group of papers immediately following views the same situation from several different angles, those from the pens of Interstate Commerce Commissioner Meyer and Clément Colson of the French Institute being especially enlightening. Next follows a series of articles relating to the nationalization of railways treated from the historical, political and economic points of view. The library is especially to be congratulated on permission to use the concluding chapter of Samuel O. Dunn's recent work on "Government Ownership of Railways" (Appleton & Co.) and an exhaustive synopsis of Prof. W. J. Cunningham's analysis of the state railways of Prussia-Hesse. The two illustrated articles in the number, "A Nation's Neglect," giving typical pictures of the reckless use of railway tracks as commons for all sorts of trespassing, and the story of "The Ohio Flood of 1913," showing the dangers to which American railways are always exposed from the unforeseeable and irresistible forces of nature, bring these aspects of railway operation vividly to the mind of the reader. As in former issues the concluding chapter consists of the annual report of the Bureau of Railway News and Statistics in which is presented the latest information in regard to American and foreign railways—the space devoted to the latter being greatly increased.

* * *

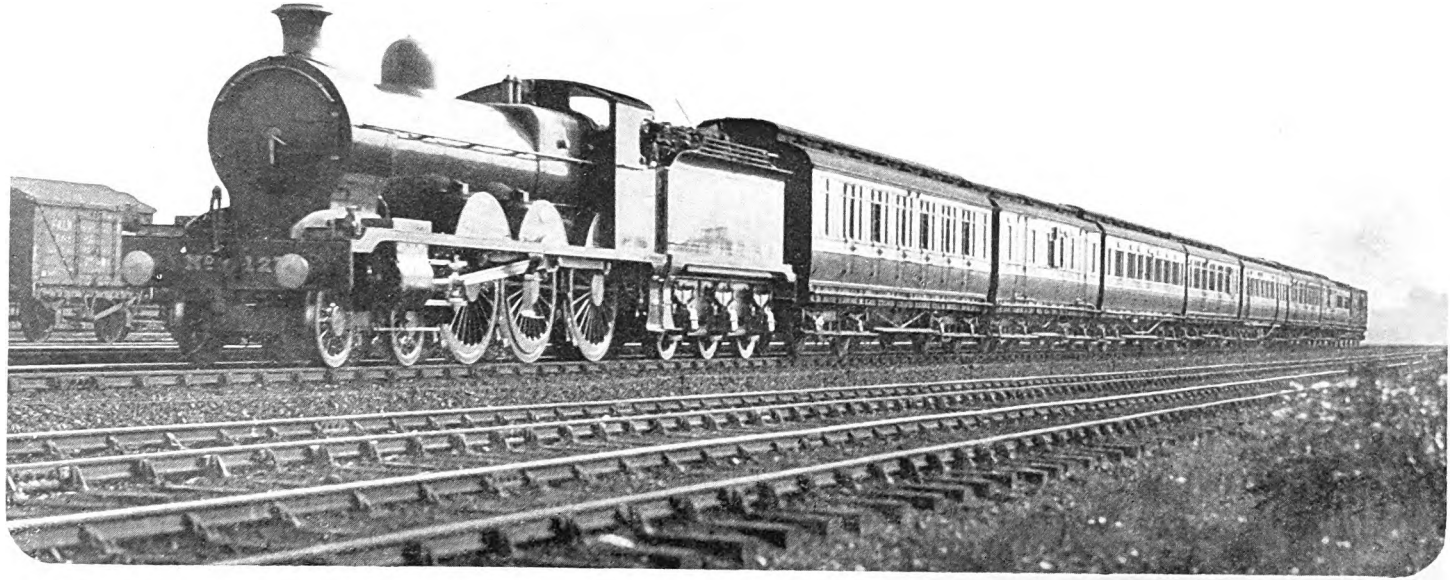
THE CHANNEL TUNNEL. Military Aspects of the Question. This is a reprint of an important address by Rt. Hon. Lord Sydenham, of Combe, G.C.S.I., formerly secretary of the committee of Imperial Defence, delivered on Monday, June 29th, 1914, in Grand Committee Room No. 10, House of Commons. Mr. Arthur Fell, M.P., Chairman of the Committee, presided, and the attendance included a considerable proportion of military men who are members of the House. At the time this address attracted very considerable attention, though recent developments necessarily place the project in abeyance for a period. Had it been already realised no doubt military operations now in progress would have been materially affected, possibly to considerable advantage.

* * *

LINK MOTIONS, VALVE GEARS AND VALVE SETTING. By F. H. Colvin. [The Norman W. Henley Publishing Company, 132, Nassau Street, New York, U.S.A. Price 50 cents.] This is a third edition, revised and enlarged, of a book which is in considerable favour in the United States, and is also appreciated here. It is a practical treatise on valve setting and describes various valve gears in use and the special attributes and problems of each.

Digitized by Google

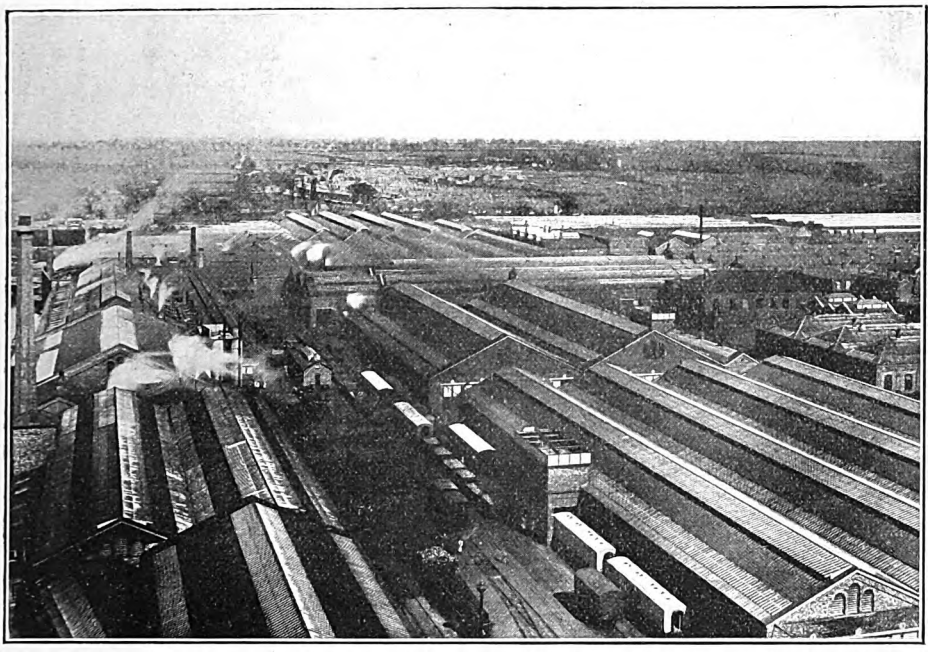
Digitized by Google



Photo] *F. E. Mackay.*

GLASGOW AND SOUTH WESTERN RAILWAY.
ST. PANCRAS—GLASGOW RESTAURANT CAR EXPRESS.
4-6-0 Locomotive No. 127.

Digitized by Google



GENERAL VIEW OF WOLVERTON CARRIAGE WORKS.
Taken from the power house chimney.

Wolverton Carriage Works, London and North Western Railway.

By J. F. GAIRNS.

THE London and North Western Railway is unique as regards British lines in that the locomotive, carriage and wagon departments are entirely distinct, each having its own premises, staff and responsible officers. But the situation is even more emphasised by the fact that, notwithstanding the nearly 8,000 men employed at Crewe Works, under Mr. C. J. Bowen Cooke as Chief Mechanical Engineer, Mr. H. D. Earl, Carriage Superintendent, has about 4,700 under his direction at Wolverton, and 2,400 at various outstations, and Mr. F. H. Trevithick, Wagon Superintendent, is in control of about 3,000 men at Earlstown.

These figures, taken in conjunction with the fact that over 3,000 locomotives, nearly 10,000 carriages and similar vehicles, together with about 300,000 goods train vehicles, have to be maintained, repaired, renewed or replaced in connection with the traffic of this great railway alone, emphasise the importance of each of these departments; and Wolverton works, now devoted entirely to the carriage department, easily attain dimensions and interest entitling them to rank among the great railway works of the world.

When the London and Birmingham Railway was first opened throughout, Wolverton ranked as the "half-way house." All trains called there, and an interval was provided for refreshments, then an unusual accommodation at an intermediate station. Owing to its central position Wolverton was also selected as a convenient site for the works (all departments) of the railway; and on the amalgamation of the London and Birmingham with the Grand Junction and other lines to form the London and North Western Railway, Wolverton became the constructional and maintenance headquarters of the southern division; Crewe dealing with the northern section.

As a railway centre Wolverton quickly

Digitized by Google

PLAN OF WOLVERTON CARRIAGE WORKS: LONDON AND NORTH WESTERN RAILWAY.

Digitized by Google

lost its original traffic importance in favour of Bletchley and Rugby, and in due course the former has become an exchange station mainly for secondary express trains and for slow main line traffic connecting with the Oxford and Cambridge branches, while even Rugby is now passed without calling by a large number of express trains. As for Wolverton, except for a fair volume of local traffic owing to the fact that it houses the "largest works entirely devoted to carriage building and repairs in the United Kingdom," its present importance is best indicated by the style under which it figures in the railway company's timetables and on the station nameboards—"Wolverton for Stony Stratford, Junction for Newport Pagnell." In fact, except that the observant traveller can hardly overlook the comprehensive sidings and carriage lines, long rows of vehicles waiting their turn to enter the works or to be sent out into traffic, and the workshop roofs, the station may often be passed with little realisation that here is the headquarters of the carriage department of the "Premier" Railway, and that this ordinary roadside station, important mainly because of the adjacent railway works and the Newport Pagnell branch, was at one time, the hub of the London and Birmingham Railway.

The works, or rather the original portions thereof, were first located at Wolverton in 1838, and for a time dealt mainly with locomotives, carriages receiving attention at Saltley, Birmingham. In fact, they were purely locomotive works from about 1840 until 1865, and here were built many famous locomotives, particularly Mr. J. F. McConnell's "Bloomers," which did so much to raise the status of London and North Western practice in the 'sixties.

A "History and Antiquities of the Newport Hundreds" contains the following:—"In 1838, when the London and Birmingham Railway was opened, neither New Wolverton nor New Bradwell existed. The station having been made in Wolverton Parish, there soon sprang into existence several houses around it; the first were grouped as follows: Bury Street, Creed Street, Ledsam Street, Young Street, Glyn Square, each named after the officials of the railway; and Gas Street, through its contiguity to the gas works that were erected for the works that were necessary at the then very important railway station, where all trains were notified to stop at Wolverton ten minutes for refreshments. The present station is the third; the first stood where now stands the Haversham Shed, overlooking the Park, and was approached from what is now termed the 'Old Road' by an incline up the side of 'Hell's Kitchen,' the present Park. The second station was to the south-west of the present one, and near to the Institute."

An old "Hand-Book for Travellers along the London and Birmingham Railway," published in 1839, says:—

"The magnitude of the works at Wolverton is the wonder and admiration to all who travel along the railway; and the utility of having a great central station on such a long line of road will be readily perceived. It was, therefore, determined that at this place a large manufactory should be erected for the purpose of repairing engines and other machinery connected with the traffic. The large building to the left of the railway, before arriving at the canal, is the locomotive engine station, for the repairs, etc., of the engines and machinery. The building is of a quadrangular form, each side being 314 ft. long; it is built of brick, with stone cornice and blockings, the style of architecture being Doric. But here there appears no extraneous ornament, all being in character with the objects for which it is designed; yet the extent of the building is so great that it has a very imposing appearance. On either side of the entrance are the erecting shops for engines; and around the courtyard are the engine and tender sheds, the joiners' shop, iron foundry, boiler yard, hooping furnaces, iron warehouse, smithy, turning shops, offices, stores, a steam engine for giving motion to the machinery and for pumping water into a large tank over the entrance gateway; in short, every convenience that a large manufactory of this nature can require is provided. Between the building and the canal, a space of about two acres is set apart for a wharf and store yard for timber, trucks, etc., and on the eastern side of the railway, opposite the engine station, is a space of several acres, appropriated to the reception of goods and cattle.

"Waiting and refreshment rooms are erected close to the station, for the accommodation of passengers, as this is the only place between London and Birmingham at which time is allowed to take refreshment. It is estimated that on the station and the works connected with it, a sum of £100,000 has been expended."

The original factory, in which—according

Digitized by Google

Digitized by Google

to the "History and Antiquities of the Newport Hundreds"—about 400 hands were employed in 1840, still stands, and is now the brake and turning shop.

In 1860, the year Mr. R. Bore was appointed Carriage Superintendent at Saltley, it was decided to bring the then somewhat scattered carriage department into one large works, and Wolverton was chosen as the site therefor. Hitherto the work had been divided, the building of the carriages being done at Saltley and the repairs at Euston and Crewe. This decision of the directors necessitated the removal of the locomotive works, which were is consequence transferred gradually to Crewe. The work of removal, commenced in 1865, was not completed until 1877, but the Carriage Department was installed at Wolverton in the former year (1865) as has already been said. Mr. Bore, who came with the Works from Saltley, remained in charge until 1886, when he was succeeded by Mr. C. A. Park, who after completing 24 years' service, retired from railway work in 1911, Mr. H. D. Earl, the present Carriage Superintendent, being then appointed.

A plan of the works is reproduced on page 254, the original buildings being in the angle near to the general offices and adjacent to the main road.

The various shops may be said to form an inverted L, the southern arm following the railway towards London, while the western section is bounded by the Grand Junction Canal and the Stratford Road. Connection with the main lines is made entirely to the south, and a system of burrowing junction lines gives access to the works sidings, as also the goods yard, without fouling the standard running lines. These connections are, however, beyond the limits of the plan. As shown the works lines are entirely distinct, and beyond Bridge No. 174, they are separated from the main lines by the Grand Junction Canal until it bends round to form the northern boundary of the works area.

MR. C. L. MASON,
Works Manager.

MR. E. G. OLIVER,
Chief Draughtsman.

The general offices are now accommodated in a neat but unobtrusive building fronting the Stratford Road, a short distance from the station. Along this road runs the Wolverton and Stony Stratford Steam Tramway, the lines of which terminate beyond the London and North Western station. Originally the offices were on ground level, but increasing staff necessitated the erection in 1897 of the present buildings, giving a road frontage of about 150 ft. They are lighted entirely by electricity and heated by steam.

On road level are the general clerks'

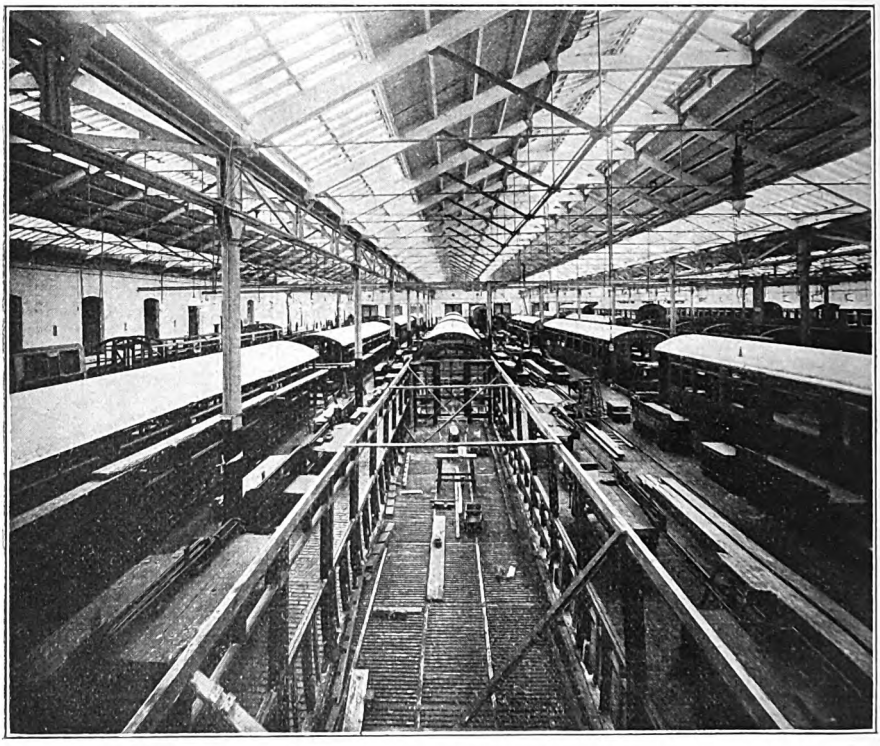
Digitized by Google

offices, Mr. Earl's private rooms, the staff of Mr. H. M. Williams (Outdoor Assistant), Mr. Jenkins (Works Accountant), Mr. Bettle (Chief Storekeeper), and Mr. Wakefield (Chief Clerk). On ground level and below the main offices are the offices of Mr. Mason, Works Manager, and his staff. Mr. Oliver occupies the position of Chief Draughtsman, and the drawing office, while in direct communication with the general offices, is actually built into what is known as the Brake Shop, now a somewhat miscellaneous department accommodated in one of the oldest buildings in the works.

Birmingham Railway). Otherwise the equipment is essentially modern, and up-to-date office methods are practiced.

Although the old sections of the works are mostly grouped near the general offices and the station, it will be most convenient to commence at the south end, and so traverse the various departments, which in the aggregate represent a length of about 1¼ miles, reckoning from the ends of the inverted L to which we have likened the lay-out.

The Carriage Finishing-off Shop (50), therefore, calls for first attention. Here



BODY SHOP (NEW WORK).
Several trailer cars for the new electric services are shown under construction.

The drawing office is carried on steel columns so that the space below it is still available for works purposes. Mr. Oliver is assisted by 15 draughtsmen and 5 drawing office clerks. Other offices require the services of about 100 men in various capacities.

All the offices are well lighted and conveniently arranged. A few relics of early days are preserved, and incidentally we may mention that Mr. Earl's armchair still bears the initials "L. & B.R." (London and

vehicles are delivered into service, after standing for the paint to harden and receiving a final overhaul before going into traffic. This is a large building containing 12 tracks. It is 197 ft. 6 in. wide and 438 ft. long, the roof columns dividing it into 4 longitudinal bays. The three eastern lines are reserved for special vehicles, including the King's and Queen's present saloons, Queen Victoria's well-known saloon (not now used), the Director's Inspection saloon,

Digitized by Google

the Duke of Sutherland's saloon (painted with Highland Railway green lower panels instead of the usual London and North Western lake), and other vehicles used for royal trains and for other special purposes. Remaining lines receive the general rolling stock, ranging from North London four-wheelers to the latest sleeping and dining saloons, all receiving final attention here before going out into service.

A steam traverser separates this shop from No. 49, known as "No. 2 Paint Shop." Here long vehicles which have already been in traffic, as distinguished from new coaches, are mainly dealt with. There are 15 roads, 12 of which are reserved for painting, while Nos. 1, 2 and 3 are provided with pits and used for over-hauling the electric light equipment of the coaches. Several tracks here, as also in No. 50, are equipped with overhead water connections for filling carriage lavatory tanks. Both these buildings are spacious airy shops, with effective roof lighting. No. 49 is 246½ ft. wide and 365½ ft. long, so that a large number of vehicles can be dealt with simultaneously. In both shops benches are provided as required for miscellaneous work.

Another steam traverser separates No. 49 from No. 46, known as "No. 1 Paint Shop Extension," in which there are 15 lines. This building is 246½ ft. wide and its longest wall extends for a distance of 380 ft. Three lines are specially paved to suit the conditions of "rubbing-down" vehicles preparatory to receiving the early coats of paint. A portion of another line is used to receive a long, trestle-supported bench on which train-indicator bands for big stations are prepared. At the time of my visit one for use at Broad Street station was being dealt with, involving a length of about 100 ft. in view of the large number of trains recorded thereon. Other lines are used for painting ordinary vehicles, mostly of small classes. No. 45 is No. 1, or the "old" Paint Shop. These three paint shops give, on 42 roads, accommodation for about 240 vehicles. Nearly 450 men are engaged here and an average of over 60 vehicles can be turned out every week. A special feature is the large colour room, in which there are seven colour mills, one pumice stone mill, one pounding machine, a putty making machine, and a white lead mixing machine. All these machines are driven by electricity, and all the mixing of colours is done by the staff, numbering seven, engaged in this room. The mixing of colours is practically a lost art in many shops, but at Wolverton it has been kept up, as it is a far more economical and reliable way of working than buying colours ready mixed. In the colour room are also kept good supplies of turps, oils, putty, tools, brushes, etc., which are served out to the men as required. In this shop is a division where train label and roof boards are prepared, exhibition models stored when not being shown anywhere, and a small division dealing with ambulance and tool emergency boxes which are now carried by virtually all main line trains; also a large number of short vehicles are painted here and are run on to their lines by a small electric traverser. In one corner is a section where station furniture is polished and finished carriage window frames and doors painted, polished and finished, while yet another division (No. 4) deals with springs for upholstery.

The trimming and upholstery shop is reached through the paint shop, of which building it is really a part. In it all the cushions, seats, and backs used in the upholstering of the coaches are made. The linings of these cushions are sewn by girls in the sewing room, placed over the cutting-out room.

On ground level may be noted the cutting-out room (No. 48), where upholstery is cut to pattern by means of a special cutting out machine, and an annexe thereto, with a lift to the sewing room above. In the latter department about 70 girls and women are employed for sewing and otherwise dealing with upholstery. They also deal with linen for the sleeping saloons, towels, blinds, etc. All machines are power-operated. A separate entrance to this department direct from the Stratford Road enables the girls to enter after and leave before the male employés.

The cloth is cut out by a machine with an endless knife, working on the same principle as a band saw. After being dealt with by the girls, the linings are returned to the trimming shop, where the seats, arms, or whatever they may be, are taken in hand by the trimmers and stuffed and sewn up ready to be fixed in the coaches. The fixing is an important part of the work, great care being taken to see that the springs in the seats are arranged to the best advantage from the standpoint of the comfort of passengers.

Adjoining the trimming shop is the leather room, where head collars for horses, carriage window straps, and, in fact, everything required for a carriage, that is made of leather, is prepared.

Digitized by Google

Digitized by Google

It will now be convenient to return to the south end of the works, and visit the small shops which parallel the large divisions Nos. 50, 49 and 46. The carriage washing shed No. 44 in the centre calls for little attention. It is a long shed with a single track and platforms on either side, water troughs with connections being provided at convenient intervals. Nos. 42 and 43 are the accumulator shops. The London and North Western Railway is unique in that it manufactures its own accumulators for carriage lighting plants. A carpenter's shop repairs and makes cell boxes. In the lead burning and plate shops the plates are cast, shaped and prepared, with melting furnaces, casting frames and a few appliances. An elaborate system of nozzles and fan-draught cowls minimises the risks of lead-poisoning. In another division the paste for the plates is prepared, the men working in white overalls, a system of exhaust nozzles and other safety measures again being adopted to safeguard them. Another section is equipped for charging and testing cells, while at the side is a long cell-washing shed containing four large washing tanks, acid mixing troughs, etc. Some 50,000 cells are dealt with annually, and in view of the fact that electric lighting is to be standard on the London and North Western Railway, these numbers will be very largely increased in the near future. Adjacent is a gas lighting shop where gas burners and lamps are dealt with, while No. 41 is the laundry, where sheets, towels, etc., for the carriages are washed and ironed ready to go into service again. This is a fine building admirably laid out for the work carried on in it, the washing and ironing of sheets, towels, mattress and pillow covers, antimacassars, etc., used in saloons and other coaches. Normally, the staff consists of about 24 women, but in the summer months—a very busy time for this department—this number is increased. There are four washing machines, three extractors and two ironing machines. Adjoining the building is a very large drying ground, where, in fine weather, the sheets, etc., can be dried by the best of all methods, namely, fresh air. During the winter months, about 22,000 articles are dealt with weekly, and this number is increased to an average of 36,000 per week in the busy summer months.

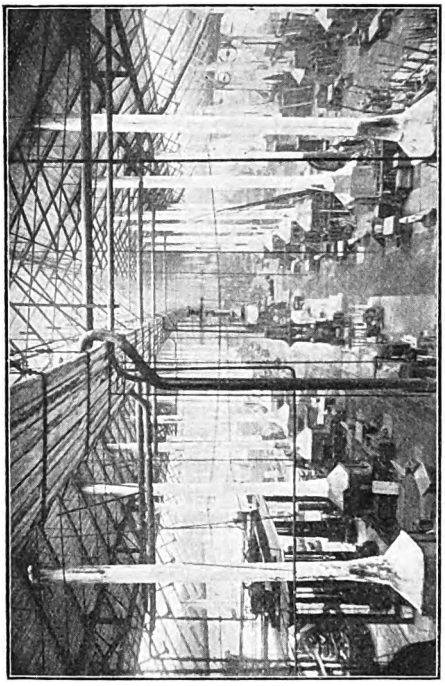
Proceeding northwards before diverging westwards, No. 34 is a somewhat old "lifting shop," now used mainly for smaller vehicles. It has three roads and is served by two overhead electric cranes. No. 32 accommodates small stores, with a division where lamp reflectors are enamelled, a tinsmith's shop and a section where seat springs are made, lavatory tanks prepared, lamps attended to and other miscellaneous work done. Opposite is a small engine shed (No. 33), for the saddle tank engines used about the works, with coal stores, etc., adjacent. Near by is a creosoting plant for preservatively treating timber, and a shed where upholstery is washed. For this purpose a vacuum cleaner plant installed adjacent is utilised. The upholstery, sectionalised, but not entirely dismantled, is first gone over with a portable vacuum nozzle by which dust is drawn out, and is then scrubbed with soap and water, after which it is again subjected to vacuum nozzles by which it is quickly dried before moisture can penetrate into the stuffing material. By this means a thorough cleaning is realised, and the upholstery is delivered again virtually as clean and fresh as when new. In the corner a British Vacuum Cleaner Co's. plant is operated by an electric motor.

At the northern end of the works area is the gas works, the railway tracks passing a little further on and terminating near the viaduct, these lines forming storage lines for materials and for general purposes. Alongside is a fine recreation ground, with cycle and other tracks, bandstand, etc. This was presented to the town by the London and North Western Railway Company in 1885.

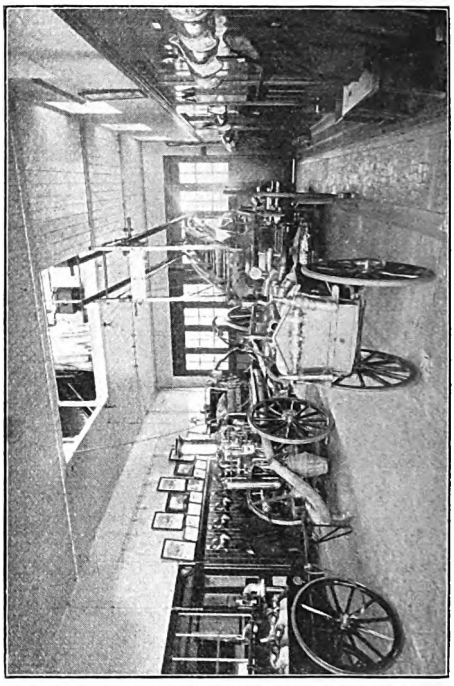
The group of buildings immediately adjacent to the general offices may now be inspected. No. 30, alongside the canal, is the brass moulding shop, while No. 31 is the iron foundry. A portion of the latter is reserved for casting brake blocks. In the moulding shop may be noted a pneumatic jarring moulding machine, and Tabor moulding machines for brake blocks, bosses of wheels, washers, couplings, axle boxes, etc. A large sand mill stands near one entrance to the foundry. The coke, which, with a mixture of new iron and scrap, is used to feed the furnace, is taken by a hydraulic lift on to a stage outside the foundry, and from there is dropped into the furnace. Draught is supplied by a blowing engine erected just outside the shop. There are three hydraulic cranes, two of 30 cwt. and one of 15 cwt. capacity.

In the brass foundry (a separate building) are another Tabor moulding machine and a git cutting machine. A gas furnace is provided for this shop, the gas being taken from gas producers just outside. Between the

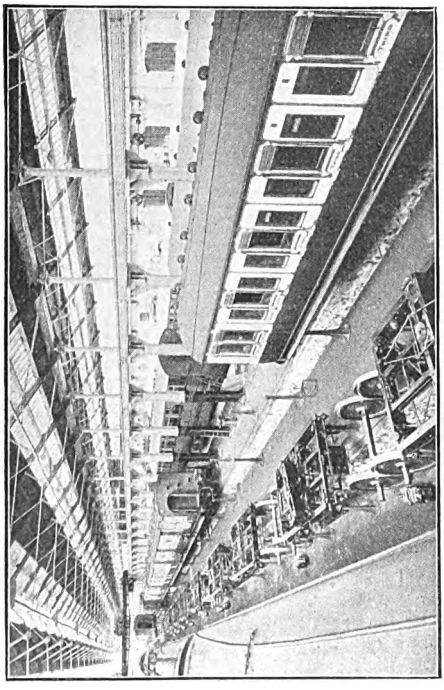
Digitized by Google



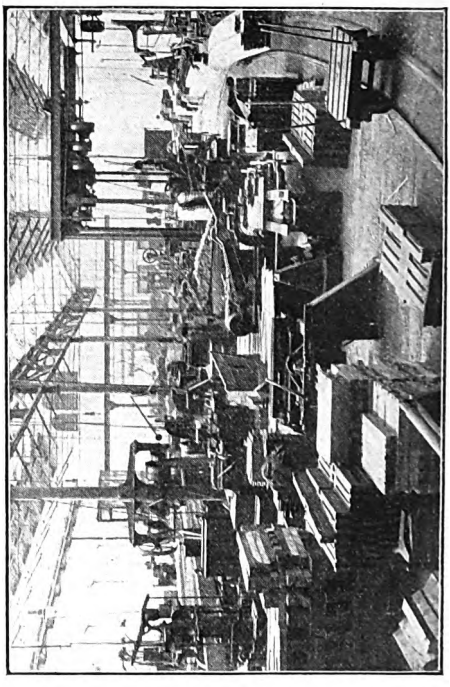
SMITH'S SHOP.



FIRE BRIGADE STATION.



ONE OF THE LIFTING SHOPS.



PART OF SAW MILL.

Digitized by Google

brass foundry and the forge there is an oil furnace for melting brass scrap. No. 29 is the Forge, alongside is the boiler room, containing three Babcock & Wilcox boilers, one fitted with the maker's design of mechanical stoker and two with Bennis stokers. These supply steam for the steam hammers, and for a blowing engine for the furnace draught. Adjacent is an installation of Ingersoll air compressors supplying pneumatic power for pneumatic tools, sand blast for cleaning castings, fettling tools and the moulding machines in the foundry.

The smithy (No. 19) is a very fine building, 350 ft. long and 90 ft. wide, built when the Locomotive Works were at Wolverton. At the east end the spring makers work, and the machines required by them are installed in this part, together with an electric welding machine and various bolt and nut machines; boiler-makers work on the south and west sides, and the forging presses are also laid down here; while the north side is mainly occupied by drop hammers. There are no less than 70 fires, including three crane fires for heavy work, in daily use, and in addition 15 oil furnaces are required for the drop hammers, forging presses, etc. Fourteen steam hammers are laid down, five of 15 cwt. each, one 20 cwt., six 5 cwt., one $2\frac{1}{2}$ cwt., and one 200 lbs. Taking the smithy and forge together, work is found for 288 men and lads.

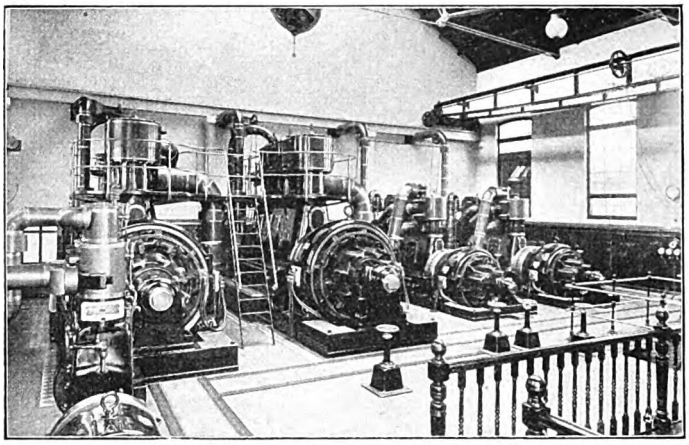
One of the most interesting things in the east part of the shop is an electric welding machine, on which many articles such as brake rods, truss rods, draw bars, etc., are welded. Working with this machine is a small steam hammer, used for swaging the welded parts of the rods. There are seven oil furnaces in this part of the shop—three for the use of spring-makers, three for the nut and bolt machines, and one for heating the bars to be bent into retaining rings for carriage wheels. The other machinery includes 2 spring machines, one for nibbing, spearing and slotting, etc., and one for cutting spring steel bars and shearing and punching cold steel; one spring testing machine for testing springs before weighing, and another spring machine for testing the carrying power of springs; one pair of eccentric rollers for tapering the ends of spring plates, eight bolt and one nut machines; hydraulic pump and spring buckle machine for pulling off the buckles of repaired bearing springs, and a hydraulic press to force buckles on to bearing springs; retaining ring bending machine and a blocking machine, used in the manufacture of retaining rings for Mansell wheels.; five pairs of shears, three for general work and two for cutting bars for bolt machines; hydraulic press for bending carriage roof channel irons, gangway and angle irons, etc.

Going from the centre of the shop towards the west end, there are three hydraulic forging presses for bending all kinds of knees for underframes and bogies, and two oil furnaces to heat the plates for these presses. There is also a saw for general work and a grindstone used by the smiths. On the north side there are two batteries of drop stamps, one battery comprising two 10 cwt. stamps and the other consisting of two 8 cwt. stamps, each with 6 cwt. dumpers. Two finning machines are provided to work with these drop stamps. Next comes the boilermakers' division, in which footwarmer boilers, tanks, etc., are made. Three hydraulic presses are laid down here, two for straightening bogie angle sides, and channels for underframes; the third is used for cutting angle iron bars. Amongst the other machinery are a shearing and grinding machine, and a saw, all of which are more particularly for the use of the boilermakers, and one or two drilling machines and a saw for general smith's work.

In the forge (29), which opens out of the smithy, there are three steam hammers, two large ones of 50 cwt. each for forging and shingling, and one of 15 cwt. for forging small work. There are two batteries of drop stamps (Brett's). One battery consists of one 33 cwt. and one 25 cwt. stamp with 10 cwt. dumper, and the other battery of 20 cwt. and 16 cwt. stamps with 8 cwt. dumper. Four hydraulic presses are used with these drop stamps for finning purposes. There are three gas furnaces, one each for the steam hammers, drop stamps, and rolling mill. The rolling mill is a 10-inch one, driven by a steam engine. Six gas-producers are laid down, three of which supply gas to the furnaces in the forge, one is for the use of the brass foundry, and two are held in reserve. A large shearing machine with double shears is used for cutting scrap iron and cropping rolled iron bars, and for punching various articles. Here is installed a large "Ajax" forging machine. There is also one oil furnace for case-hardening general work. Machines in the smithy are operated by means of a wall engine, electric drive not yet being installed here.

No. 15 is the carpenters' and joiners' shop —often known as the Old Finishing Shop— where furniture and general joinery for the railway and works and offices, ticket cases

Digitized by Google



POWER STATION: GENERATOR ROOM.

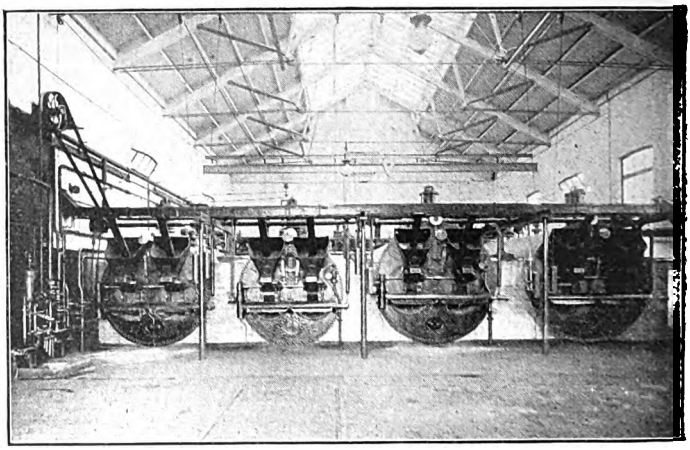
for station booking offices, platform barrows and trucks, etc., are made. The machinery includes planing machines, jig saw, shaping, tenoning, moulding, and mortising machines, four lathes for general work, one spoke-turning machine, and one glass papering machine. Running the length of the shop is a raised platform, reached by a flight of steps, which is used as a storeroom for desks and other furniture, both new and old. Included in this shop also is the pattern-room, in which all the patterns required in the works are made. This room is provided with a band saw, hand-mitreing machine, and a lathe. Below is a division of the general stores.

Outside this building is a range of Lancashire boilers placed below ground level and sheltered above, though not in front. Some of these are fired with saw-dust and refuse from the saw mill. There is also a gas-producer using the same material, and supplying two of these boilers. The furnaces of two locomotive boilers on ground level are fitted with mechanical stokers. These boilers supply the engines of the hydraulic pumping station between the carpenters' shop and the saw-mill. Near by are two water softeners, also the fire main pump.

The saw mill is a very extensive and well-laid out shop. There are no fewer than 80 machines—many of them large ones—of various kinds, and of these, saws are naturally in the majority. They include frame saws, band saws, chain bench saws, jig saws, cross-cut saws, large and small rack saws, and circular saws. The frame saws include two for cutting logs and two for deals; the former hold any number of blades up to 30, and the latter up to six. Apart from the saws, the machinery comprises mortising, boring, tenoning, rebating, moulding, planing and scraping machines; a general joinery machine, a wood-chopping machine, and tab-shaping and boring machines for wheel tabs. There are two cranes in use, one in the mill and the other just outside. The saw-mill is in two bays, with an extension not quite so wide owing to the canal alongside. Panel scrapers and planers for finishing panels, and a wood-chopping machine may also be noted.

At one side is a tool room containing machines for sharpening circular, band and frame saws, plane cutters, etc., some of them of automatic designs.

All machines are driven by electric motors placed in the basement, either singly or in groups, and a system of conveyors is installed whereby saw-dust and shavings are carried from shoots fitted to each machine to the boilers above referred to. Along one side of the extension is a marking-out section. Outside the extension and between it and



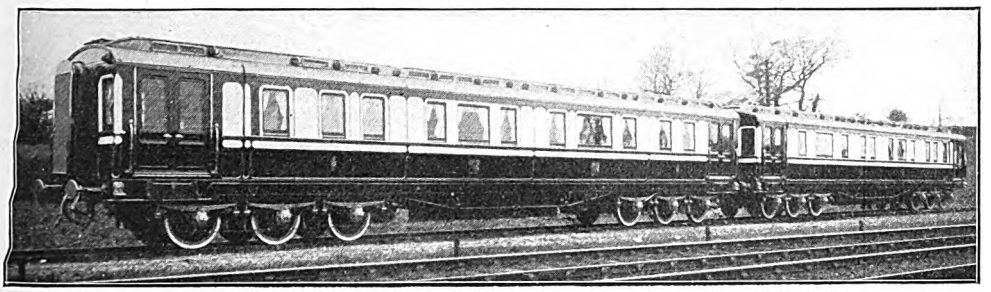
POWER HOUSE: BOILER ROOM.

Digitized by Google

the canal is a railway track for conveying timber. In the yard adjacent is a timber yard spanned by an overhead crane gantry.

Electric drive is employed systematically for most of the shops at Wolverton, and therefore the power station (No. 9) is, in some respects, the most interesting building of all. It is situated just beyond the saw mill and by the side of the canal, from which it draws water. It supplies both light and power to the Works. The building is 137 ft. long by 50 ft. wide inside. The chimney stack is 150 ft. high.

In the boiler house there are four Lancashire boilers, two 30 ft. long by 8 ft. 6 in. in diameter, and two 30 ft. long by 7 ft. 6 in. in diameter, all furnaces being fitted with Bennis stokers. They are fitted with superheaters, in which the steam is heated to 460 degrees Fahr. The boilers are worked at a pressure of 180 lbs. per sq. in. At the back is an economiser containing 448 pipes, the scraper gear of which is driven by a 4 h.p. motor. As the ordinary water is very hard, it is softened in a Stanhope water softening apparatus before being used. Bennis ash and coal handling plant, with a Zimmer conveyor, are also provided.



ROYAL SALOONS.

In the engine room are four Bellis & Morcom triple-expansion condensing engines, two of which are of 290 brake horse-power and run at 420 revolutions per minute. They are coupled to two 200 k.w. Westinghouse generators, which supply current at a voltage of 250. The other two are of 580 brake horse-power each, running at 360 revolutions per minute, and coupled to two 400 k.w. Westinghouse generators.

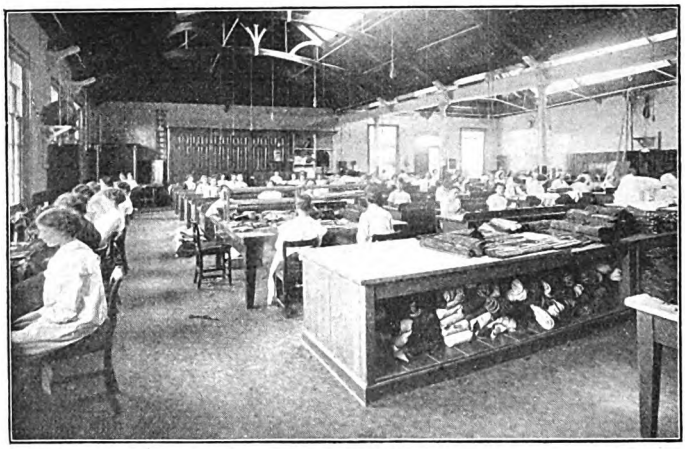
The condenser pit contains two Admiralty pattern surface condensers, having 1,400 sq. ft. of cooling surface each. There are also an oil-separator and an oil pump, the latter of which is driven by a 1 h.p. motor. Overhead is a 6-ton travelling crane. The switchboard has 13 panels, all of which are composed of Italian marble. Five are generator panels, six feeder panels, one recording ammeter panel, and one is blank. Opening out of the engine room is the switchboard attendant's office, and adjoining this is a small stores containing oil, filters, etc. The engine room is ventilated by a motor-driven fan. The floor is covered with red tiles, with an ornamental bordering round the walls and engine beds. This bordering forms a pleasant contrast to the tiles, and gives a finished appearance to the whole.

The remaining extent of the Works area along the northern portion is mainly given over to timber stores and small departments. No. 8 is a large timber drying shed. No. 4 is a timber stores arranged in three bays for panel and more delicate woods, and No. 2 a large shed with corrugated roof and known as a timber hoist, this building being open at the sides and spanned by an overhead crane serving the various storage compartments. It is mainly used for planks in the rough. No. 1 receives mainly log timber and tree trunks, stored in the open until required, a big gantry spanning the yard. It is estimated that as a general rule these stores will accommodate about 3,500,000 sq. ft. of timber, or about 300,000 cub. ft.

A new hair-carding shop (No. 54) has recently been erected at the west end of the Works, built of corrugated iron, and containing a cutting-up room, with benches and storage room for old linings, cushions, old hair, etc., and for the cleaned and carded hair. There are two sets of three hair-carding machines, each driven by a 15 h.p. motor, and a 36-inch Blackman fan, to draw the dust out from these machines into the dust collector placed in a small shed just outside the shop. A sewing machine for sewing bags is driven by a $\frac{1}{4}$ h.p. motor.

Adjacent is a small mortar grinding plant and concrete breaker for the use of the

Digitized by Google



UPHOLSTERING AND TRIMMING: SEWING ROOM.

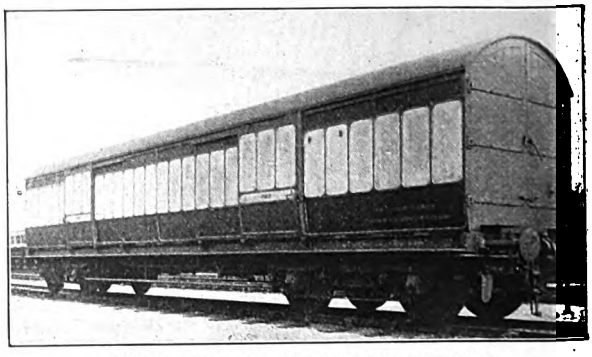
building department responsible for the maintenance of the works buildings.

No. 3 is the new paint shop, a magnificent department where all new vehicles are given their distinctive livery. It has 21 roads, on which about 120 vehicles of an average length of 50 ft. can be painted at one and the same time. The shop has its own colour-room, containing two colour mills and one white lead mill, these being worked by electricity. In both this and the older paint shop already mentioned special attention has been given to the heating arrangements, the shops being kept warm and, as far as possible, at an even temperature, in order to facilitate the drying of the paint. The shop is built so that plenty of light may be obtained, and, in the short days of winter, plenty of artificial light is provided, electric incandescent lamps being placed in between the roads in addition to arc lamps hung from the roof. The work of the shop, therefore, does not suffer at any time for want of light. About 160 men and apprentices are employed in this department.

An electric traverser outside serves all 21 roads. Three lines at one side are reserved for rubbing down. To some extent this shop is also utilised for painting big coaches which have been repaired.

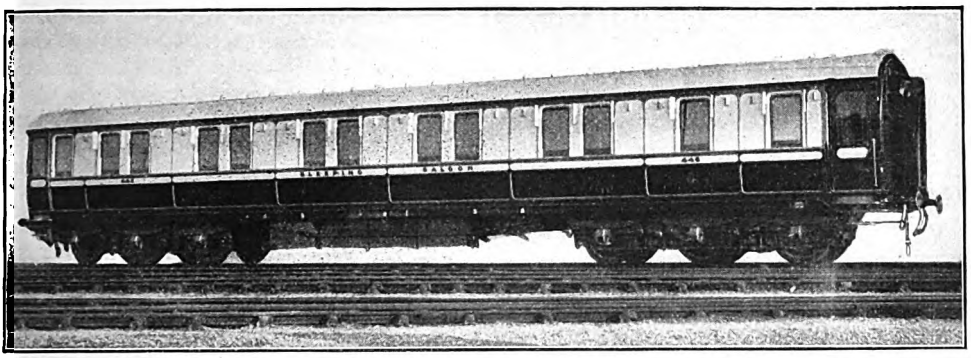
No. 5 is the new lifting shop, 750 ft. from end to end, and the longest building in the works. Of this length, 315 ft. is due to an extension carried out recently. There are two bays, with three tracks in each, the centre line being used for moving bogies and wheels as required. The overhead cranes, of 15 tons capacity each, run the full length of the shop.

No. 7 is the wheel and axle shop. It is in four bays, and is served by one 20 h.p. motor and two 30 h.p. motors. Along one side of the southern bay is a series of axle-turning lathes, with tyre-boring lathes, etc., on the other side. In the next division are wheel-turning lathes and boring machines for the centres of pressed steel wheels, now adopted. In the third bay are wheel presses, with accommodation for putting together Mansell wheels, wheel-balancing machines, etc. The fourth bay includes in one corner a gas furnace for applying tyres to steel centre wheels, and a series of wheel lathes, some with centre drive and adapted for high speed turning, these being fitted for direct electric drive. There are seven axle lathes—three for dealing with axles in the rough, three for finishing them off to the exact size, and one for cutting to length and centring; one burnishing lathe, seven tyre boring lathes, one double boring lathe, two retaining ring lathes, one boss turning lathe, seven wheel-turning lathes, one centring machine, a tool grinding machine, and a spring-balancing machine on which the wheels are balanced before being put on the axle. Two wheel presses are in use, for assembling repaired Mansell wheels, each working at a pressure of about 3 tons to a sq. in.; and for fixing a pair of wheels on to the axle there is a double press, which forces the



SPECIAL VAN FOR THEATRICAL TRAFFIC.

Digitized by Google



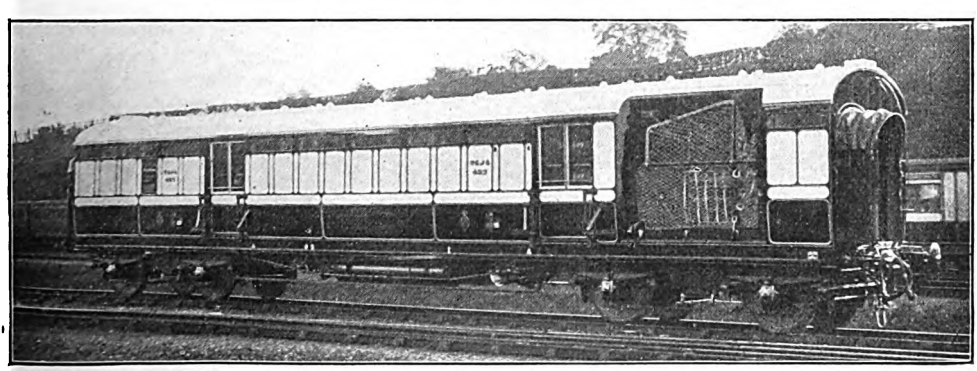
NEW TWELVE-WHEELED SLEEPING SALOON: WEST COAST JOINT STOCK.

wheels on at a total pressure of between 60 and 90 tons. Another press is utilised for pulling off old wheels. A space is reserved for receiving wheels and axles, through the general wheel yard which is outside the shop. An electric traverser is available for transportation outside, with hydraulic cranes to the wheel presses and a system of compressed air hoists for individual machines inside. A splendid view of this lofty and airy shop is had from the gallery of the elevated foreman's office placed in the centre of one end walls so that he has oversight of the whole shop. We may mention that pressed steel wheels are now largely employed on the London and North Western Railway, and many are to be seen in the wheel yard and in the wheel shop.

No. 6 is the large carriage repair shop. It is a large building with five bays, having 15 roads. As a general rule, only long vehicles are taken in here for repairs. One road is set apart for the testing of the heating apparatus, etc., on vehicles. There is not much machinery, two electric saws, with boring attachment to each, and a grindstone, meeting all requirements. About 250 men and apprentices are employed in this shop.

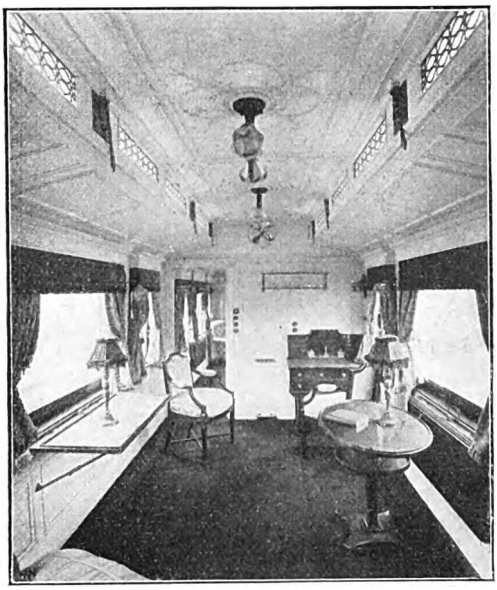
At the eastern end is another electric traverser connecting with a group of shops. No. 10 is known as the horsebox shop, that is, it deals with repairs to horseboxes, carriage trucks, parcel and milk vans, motor car trucks and various smaller vehicles which are incidentals to coaching traffic. No. 12 deals with road wagon repairs, though it is tending to becoming also a motor road vehicle body making and repair shop as these vehicles are becoming more numerous.

A steam traverser between these shops and Nos. 2 and 13 connects with two interesting divisions. No. 12 is a finishing repair shop. Bench work is mainly done here, but the system is that men engaged on each repair job come to No. 12 to do the actual woodworking involved, so that only dismantling, measuring up and refitting, and finishing are done in the body repair shops. Each man has his own bench and tools, and a few power operated tools are also available as required. Alongside No. 12 is an extension of the new work finishing department, with machines for



TRAVELLING POST OFFICE.

Digitized by Google



ROYAL SALOON.
His Majesty's Day Compartment.

cabinet work, etc., for new stock. No. 20 is the principal finishing shop for all new work, and here is found modern machinery for dealing with all interior and decorative wood work, with all necessary appurtenances for coping with this important part of carriage building. About 300 men and apprentices are employed on new work and 180 on repairs.

No. 13 is the body shop where all woodwork is assembled and carriage bodies erected. This shop is very conveniently placed with reference to the saw mill, in order that the timber used in the building of the coaches, after being marked out and cut up in the mill, can be taken across to the body-makers with the least delay. The shop is built in four bays, and has 12 roads—3 roads to a bay. On the two outer roads of three bays coaches can be built, the fourth bay being used for a large door-making gang, step board makers, seat makers, and for dealing with steel panels, roof irons, stores, etc. In this bay a clear road is kept for the reception of underframes, where they are finally prepared before being put under the bodies. The centre road of each building bay is used for the storage of framing and timbers of all kinds, and is also filled occasionally with bodies on their frames which are waiting to leave the shop. Twenty-four of the longest bodies can be built at one and the same time. The workmen's benches are arranged between the roads and along the walls of the shop. At the time of my visit a number of bodies for trailer coaches, to be employed when the general electrification of the London suburban area allows of electric traction being adopted systematically, were being put together here.

Another steam traverser serves shops Nos. 16 and 17 and these together with the small departments denoted as Nos. 20, 21, 22, 23, 24 and 18 may be considered together. No. 20 is a veneer shop, containing veneer-presses and a special steam heated press for quickly applying and drying veneer when attached to its ground work.

No. 16 is the underframe shops. For all modern passenger vehicles steel underframes are employed, and the machinery installed consists mainly of single and multiple radial and ordinary drills, a machine for milling the ends of frame bars, a machine for slotting drawbars, cold saws, punches and milling tools, etc. The line shaft, motor driven, operates a series of slotting and drilling machines and grindstone, but separate motors are provided for the saw benches for cutting mild steel, and for the shaping, drilling, punching and shearing machines. Four levelling blocks are in use in different parts of the shop, and there are two hydraulic presses for straightening channels and plates. Six overhead cranes with pneumatic lifts and chain pulleys are provided, and one large overhead crane carrying 10 tons. This latter is used chiefly for lifting underframes from one part of the shop to the other and placing them on the bogies. Portable pneumatic forges and special oil furnaces are used for heating rivets, and the riveting is done by pneumatic riveters.

No. 17 is a somewhat similar division but it contains a Tweddell press for shaping steel panel plates, and also deals with steel flooring, vestibule steel-work, and other miscellaneous work, while repairs are also undertaken here. Alongside the body shop is a shed containing a machine for straightening sole bars and other long members of frames and grinding machine for surfacing sole bars and headstocks.

Nos. 23 and 24 are polishing rooms for finishing panels and cabinet work, girls being mostly employed. No. 18 is the electrical shop where train lighting dynamos are made and repaired, lamp fittings seen to, and associated work dealt with. There

Digitized by Google

are six testing stands for running dynamos under trial, together with bobbin and armature winding appliances, a lamp testing frame, a small dark room for lighting trials, vacuum drying ovens for armatures, coils, etc., and photometric and other equipment. In an enclosure is a small tool and material store.

This electric shop is especially laid out for the manufacture of the Wolverton system of train lighting, and as it has been decided to fit all the London and North Western Railway stock with electric light, there was plenty of evidence that the work was being rapidly pushed on with. The system comprises a variable speed dynamo, a regulator, and a single battery, and is so reliable that the dynamo and regulator are locked up when the vehicle leaves the works and are not interfered with until it comes in again for its usual overhaul after completing its mileage, and thus cost of maintenance is reduced to a minimum. The regulator is automatic and designed to control the output of the dynamo to the needs of the battery and work circuits, and thus the efficiency is very high.

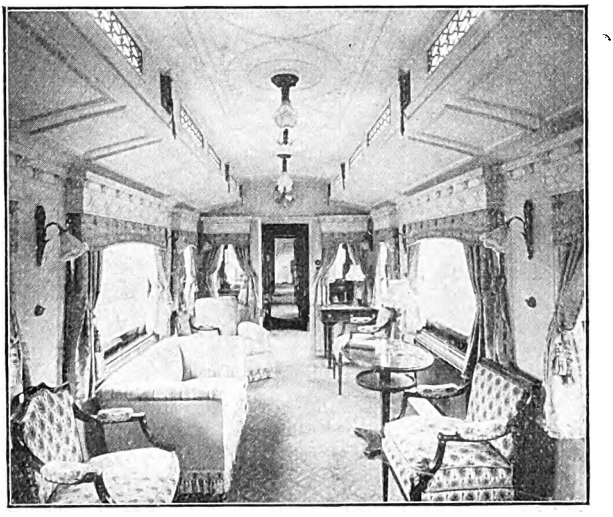
In the yard between Nos. 23 and 24 and Nos. 20, 21 and 22 is a trough for washing firehose. No. 21 is the time office and workmen's main entrance. Here all the time keeping and other duties incidental to it are carried out and here the payment of the majority of the men each week takes place. There are two other smaller pay offices at the east and west end of works. So well are the offices arranged for this latter work that the four and a half thousand men are handed their wages by the pay-clerks in less than ten minutes.

Owing to the nature of the industry carried on, which necessitates the storing of huge quantities of timber and other inflammable materials, means must be provided for fire fighting. The works are therefore provided with a very well equipped and up-to-date fire station and appliances. An excellent brigade of about 30 officers and men, ably captained by the Works Manager, Mr. C. L. Mason, assisted by Second Officer Mr. H. H. Coker, has several smart records to its credit. The whole of the works is very satisfactorily protected by a well laid high pressure system of water mains and hydrants, and what with this and the excellent brigade the risk of excessive damage by fire is reduced to a minimum.

No. 22 is the workmens' dining hall. On the ground floor is a section for the girls employed in the works, the remaining space containing a heating boiler. Two upper floors together accommodate nearly 2,200 men, each having his numbered place with table, while adjacent staff premises contain steam ovens, tea and coffee brewing and usual appliances for meeting the needs of those workmen who do not go home for meals during the day.

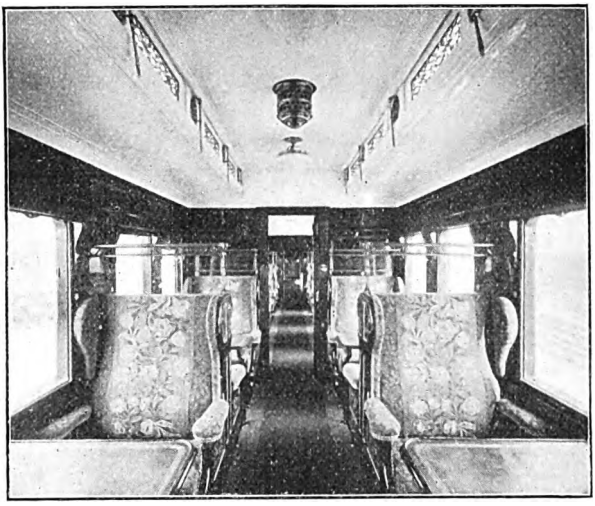
No. 25 is the bogie shop. At the end a section is used for general mill-wrights' work, with a few machines, lathes, planers, slotters, drills, etc. A walking crane serves this division. Bogies are built up in the centre of the shop, and other equipment includes machines for grinding the faces of axle box covers, benches for axle-box fitters, radial and ordinary single and multiple drills, a large slotter for frame bars, a special individually driven double saw, together with various planers, slotters, drills, lathes and shapers. In one corner is a hydraulic plant for the shop, and a small accumulator. A shop stores is provided in an alcove.

A special feature of this shop is a system of overhead runways serving many of the machines, each having its own branch line. This is of what is known as the Q.E.F. system, equipped by Messrs. Herbert Morris & Bastert, Ltd. No. 26 is a division of the



ROYAL SALOON.
Her Majesty's Day Compartment.

Digitized by Google



INTERIOR OF FIRST-CLASS DINING CAR.

general stores, with fireproof doors to the oil section. They are divided into five portions. The entrance is used for loading and unloading wagons and vans, and next to that is the part in which oil, paint, and varnish are stored. A third portion is used for issuing goods to the shops and out-stations, and in the fourth part gas fittings, pipes, lamps, lavatory basins and fittings, etc., are kept, while the fifth room is used for india-rubber goods, copper and brass articles, and lincrusta and millboard panels. A landing is built overhead, running the entire length of these and the iron stores, and this is also divided into separate parts, distinct classes of goods being kept in each. This landing is reached by a lift. The iron stores adjoin the general stores, with which there is a direct communication. Here all kinds of iron and steel articles are kept, ranging from bolts, nuts, screws and washers, to heavy rolled iron and forgings. Everything is systematically arranged, so that anything that is required may be got out without any trouble or delay. Several weighing machines are provided, ranging from a spring balance taking up to 40 lbs. to a 5-ton weighing machine. A narrow-gauge trolley way runs the entire round of both stores.

No. 27, a section of the original works, and still containing evidence of its early date, is now the general fitting shop. At one end is a tool room, with appliances for making cutters and taps, tool sharpening machines, a cutter hardening furnace, and lathes, etc. Among interesting equipment elsewhere may be noted a special grinder for dynamo spindles, automatic lathes, two head vertical millers for cutting dies, lathes for buffer turning, stamping presses, besides general tools of various types. A tool store is provided along one side. At the end is a nut and bolt shop, with multiple tapping machines, and a special milling machine for making coupling screws. Adjacent thereto is an electric clock by which shop hours are governed. No. 28 was formerly the wheel turning shop, but it is now used mainly for automatic machines, of which an interesting series are provided, making bolts, stays, pins and other details. In a corner is a small gas engine and dynamo which can be utilised for lighting and running a few machines at night when there is no justification for keeping the power station at work.

In line with No. 28 is the brass stores, No. 35. The section marked 36 is a brass-finishing shop. One side of the shop is taken up with 20 polishing machines which are driven by a 10 h.p. and a 25 h.p. motor. At the end of the row of machines is a wooden stack and suction fan which draws away the dust created by the polishing machines. Adjacent to the stack are four steam-heated lacquering stoves and benches. The other portion of the shop is taken up with lathes and machines of various descriptions, including brass-finishers' capstan and ordinary lathes, drilling, milling, and emery disc grinding machines, etc., one special machine for turning large brass clack balls and two engraving machines. The machinery is driven by four sections of shafting, with a separate motor for each section. A shop tool stores is provided in one corner, also a room for repairing and testing pressure gauges fitted up with pumps and standard test gauge. In a gallery over a portion of the shop is the brass dipping room and electro-plating and oxidising room. The plating is carried on in eight vats, one each for silver, nickel and black nickel, two for brass plating, and three for copper plating. Acid pans, hot potash and alkaline copper baths and two water tanks, one for cold and the other for hot water; also a tank for oxidising solution. The big building forming what is known as the brake shop (No. 37) was originally the principal section of the original works.

Digitized by Google

Its distinctive feature is the outer wall facing what was for some time the running lines of the railway, though these tracks are now wholly within the works area, the main lines passing on the other side of the canal. As far as possible original characteristics have been carefully preserved, though the wall cannot be seen from passing trains. One corner of this shop is partitioned off for brake work, brake testing, metalling of axle-box and other bearings and for dealing with passenger communication apparatus, etc. It is here that the various valves, heaters, etc., comprising the Wolverton system of steam heating are manufactured, and all the stock of the Company is rapidly being fitted with this patent arrangement.

No. 39 is the testing room. In this room samples of most of the material used in the building of the coaches are tested. It is fitted with machines for testing couplings, india-rubber cones and rings, for ascertaining the tensile strength of all iron and steel, and the breaking weight of iron and timber, for testing wires, small chains, ropes, etc., an oil testing machine, an apparatus for giving the flashing points and viscosity of oils; and a machine for testing the rubber coupling pipes used for the automatic brake and the steam heating system. Enclosed in the building is a large dark room containing photometers for obtaining the lighting power of coal and oil gas, and adjoining the testing room is a chemical and physical laboratory. There is also a dark room fitted up as a railway carriage compartment for comparing lighting effects. Adjacent is the photographic department. This is a fairly large building fitted with every convenience for printing and copying photographs. In the printing room are two sets of apparatus for making prints, and an arc lamp for printing and copying photographs. The dark room is admirably suited to the purpose, and is fitted with everything that is necessary for photography.

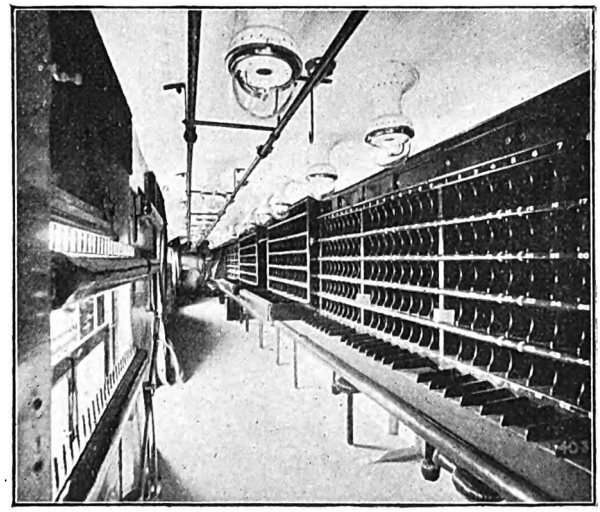
An electric traverser serves the centre of the brakeshop, and in the brakeshop proper, actually a portion only of the building, are benches for dealing with brakes, heaters, passenger communication apparatus and miscellaneous work. The drawing office is built out into this shop, as already mentioned.

A few general remarks concerning the equipment of the works may now be given. Altogether there are nine traversers. Four of these are electric, each driven by a 40 h.p. motor, which takes its current from overhead trolley wires. The other five are steam driven.

Prior to September, 1901, the power in the various shops was derived from separate steam engines, gas engines and two distinct electric power plants. It was recognised, however, that for works with a number of separate shops, covering a large area, electricity was the most suitable and economical means of supplying power, and the central power station already described was designed, from which the current could be transmitted to all parts of the works. These works were, in fact, the first railway shops to adopt electric driving and lighting throughout, and the power station is a very fine example of its kind.

The lighting for the whole of the works and offices is supplied from here. In the shops arc lamps are used, and in some cases inverted arc lamps where general lighting only is required, machines being supplied with incandescent lights. However, in the majority of shops, such as the paint shops and repair shops, general lighting is not sufficient, and in these cases incandescent lamps are used. These are in the form of pendants, and are placed about every 15 feet. Portable lamps can be connected to these pendants in order to facilitate the work inside coaches.

The outside lighting in the yard is by



INTERIOR OF TRAVELLING POST OFFICE.

Digitized by Google

arc lamps fixed on posts about 25 feet high. Two incandescent lamps are also fixed on the same posts about 8 feet from the ground. During the hours of darkness, when the works are open, the arc lamps are lighted, but when the works are closed the arc lamps are put out and the incandescent lamps on the same posts lighted for the use of the night watchmen. The offices are lighted by electric incandescent lamps. With the exception of a short length of bare cable attached to insulators outside the shops, and some insulated cable hung from the roof trusses, the cables are laid throughout the works in troughs filled in with bitumen, junction boxes and manholes being fixed where necessary.

Some of the shops are heated by means of steam pipes, but the majority are heated on the high-pressure hot water system, separate coke-fed boilers being used for each shop. This furnace is beneath the level of the ground, and the heating pipes are laid in troughs below the level of the floor. These troughs are covered with cast iron grids. In this way there is no obstruction caused by heating pipes above the floor level.

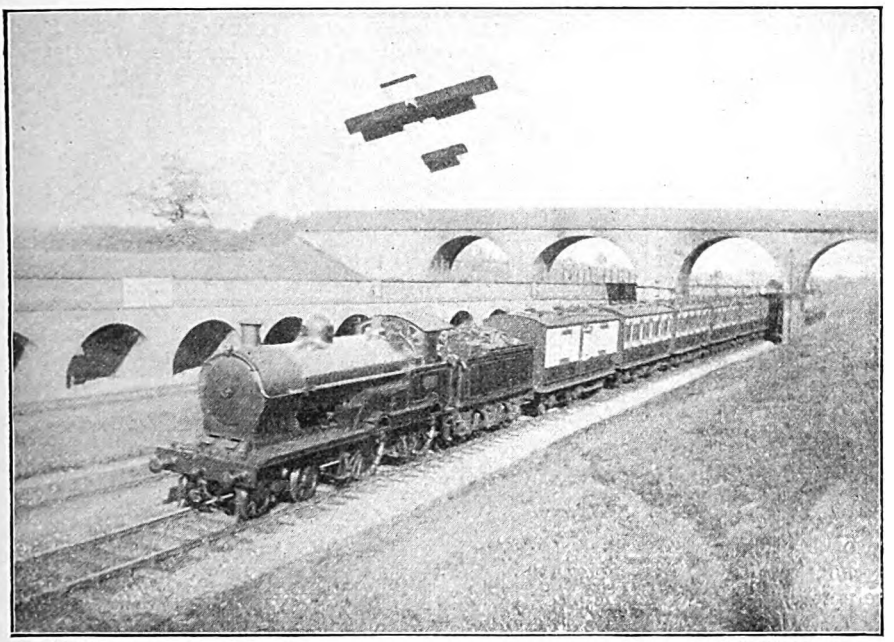
A series of representative examples of modern London and North Western Rolling Stock are illustrated, but most of them will be too well known to require extended description on this occasion. Features of modern practice are the Wolverton system of electric train lighting and steam heating, and a new lavatory equipment whereby perfect flushing is obtained with very small quantities of water. These are, of course, in addition to the features which now characterise London and North Western carriage design and equipment.

We may also mention that "Decolite," supplied by Bells United Asbestos Co., Ltd., is now extensively used on the London and North Western Railway for the flooring of railway vehicles of various classes and in other applications, as well as by most of the other leading railways. This material is of British manufacture, and since its introduction, 10 years ago, only British labour has been employed in connection therewith. It is being introduced so largely as the result of trials made over considerable periods.

Mr. Henry Douglas Earl, Carriage Superintendent, London and North Western Railway, entered the London and North Western Railway Locomotive Works at Crewe as an apprentice on the 18th March, 1869, under Mr. John Ramsbottom, the Chief Mechanical Engineer of that date at Crewe. He was afterwards transferred to the Drawing Office in June, 1874, under the then Chief Draughtsman (Mr. C. Dick). He was appointed in June, 1875, to be Assistant to Mr. T. W. Worsdell, Works Manager, having charge of the steel making plant, forge mills, etc., also new works building construction. Afterwards he was appointed Works Manager, in succession to the late Mr. C. Dick, in the Locomotive Works of the London and North Western Railway at Crewe in 1888 under the late Locomotive Superintendent, Mr. F. W. Webb. In July, 1903, he was appointed Wagon Superintendent of the London and North Western Railway Company at Earlstown, and on the 1st May, 1910, he was made Carriage Superintendent of the London and North Western Railway at Wolverton, which position he now holds. He is an Associate Member of the Institution of Civil Engineers.

In conclusion the writer has to acknowledge the courteous co-operation of Mr. H. D. Earl and other officers of the London and North Western Railway in reference to the preparation and illustration of this article, and of the personal assistance rendered by Mr. Oliver and his staff as regards his tour of the works and collection of information now utilised.

Digitized by Google



Photo] [*F. Thompson.*

"THE RIVALS."

Down express approaching Rugby. 4–4–0 superheater locomotive, No. 2428, *Lord Stalbridge.*

This photograph was taken under unexpected conditions. The aeroplane was flying from the direction of London, and Mr. Thompson was, fortunately, able to use his camera to include both aeroplane and train.

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

IN continuation of the serial discussions that have been proceeding in these columns with regard to the dimensions and proportions of modern superheater express locomotives, two further tables are reproduced herewith giving details of working pressure and the diameter of driving wheels. The latter subject was dealt with in last month's issue, this dimension, of course, being one that has not varied with the introduction of superheating. Conversely, in almost every instance, the provision of a superheater in existing or new locomotive types has been met by a marked reduction in the working pressure, so far as the standards of the line in question are concerned. Indeed, except in one or two instances where particular reasons have caused the retention of a higher pressure, it is only in cases where the superheater equipment has been of the moderate or low-degree type—as the Swindon or the Drummond apparatus—that the original standard pressure has been retained. Thus the working pressure of the 4–6–0 express engines of the Great Western Railway remains at 225 lbs., while that of the London and South Western Railway 4–6–0 and 4–4–0 types fitted with the Drummond superheater or steam-dryer is still 200 lbs. per sq. in.

Leaving these companies' locomotives out of consideration, however, a comparison of these tables of working pressure with that which appeared in the March, 1911, issue of the RAILWAY MAGAZINE, reveals a substantial drop in the figures. For example, the average working steam pressure of 4–6–0 express engines in the latter table was one of approximately 190 lbs. per sq. in.; in the present table, with the exceptions above-mentioned, it is only 170 lbs. 4–4–2 designs

Digitized by Google

showed a similar average; the figure is now only 160 lbs.—a fall of 30 lbs. per sq. in. In the case of the 4–4–0 engines the difference is not quite so marked, the average reduction being from 180 to 165 lbs. per sq. in. The average working pressure of all the types tabulated in 1911, three superheater engines excepted, was 185 lbs. per sq. in.; the corresponding average of those shown herewith, excepting the Swindon and Drummond superheater engines, is 165 lbs. per sq. in. So widespread a modification in this important working detail, therefore, demands some attention.

In explaining the change, we must of necessity traverse some familiar ground, both as regards the effect of variations of working pressure on the performance and maintenance of the engine, and also as to the added effect of superheating. An increase in the working steam pressure of a locomotive is the simplest way of increasing its tractive power in a corresponding ratio. The method of effecting the increase is equally simple, in that nothing further requires to be done than to strengthen the boiler adequately and to adjust the safety valves to the required figure. So simple, indeed, is the latter expedient that drivers in the early days of the locomotive, if they did not actually "sit on" on the valves as sometimes reported, frequently were known to weight them in order to increase the head of steam, and this nefarious practice led to the adjustment of the valves being permanently closed in and sealed.

It is comparatively easy, therefore, to add to tractive power by raising the working pressure, but an undue increase of the latter is open to formidable objections, on the score of cost. Not only must the boiler be strengthened, with an accompanying increase in its weight, but the ability of high-pressure steam to discover points of weakness and faulty joints necessitates also greater perfection in the design. This is especially the case as regards the tube-plates and the crown-plate of the fire-box, which may be called upon to withstand a gross increase of pressure amounting to several tons, consequent on a comparatively moderate increase in the working pressure per sq. in. Again, the increased temperature that accompanies a higher pressure is bound to affect the forces of expansion and contraction at work in the boiler shell. The deposit of scale and the action of chemical impurities on the boiler are also accelerated by a rise of temperature and pressure. Finally, the maintenance of a higher pressure demands increased fuel consumption, and it has been demonstrated by systematic experiments that the consumption of fuel increases in a greater ratio than that in which the pressure is raised.

Now we proceed to the effect of superheating. Highly superheated steam, as has often been pointed out in these columns, has certain important properties. In the first place the act of superheating causes the steam to increase in volume, while the ability of superheated steam to expand without condensation in a greater ratio than saturated steam makes it possible for the cut-off to be effected at an earlier point when the engine is running at speed. This freedom from condensation enables larger cylinders to be used, whereas with saturated steam the extensive condensation area thereby provided is a very serious objection. Secondly—as is emphasised in an interesting letter that I recently received from a New York correspondent—a given amount of steam leaving the boiler is expanded into a much larger volume without reduction of pressure (save a small percentage of loss due to friction as the steam passes through the superheater elements.)

These properties may be utilised in three ways. First, the diameter of the cylinders may be increased, and in this way the increased volume and undiminished pressure of the steam may be utilised to increase the tractive effort. This method adds greatly to the hauling capacity of the engine, but at heavy cost, if the working pressure be already high, especially in the matter of maintenance, as the effects of superheating the steam have to be added to those of maintaining the working pressure at its existing level. Second, the pressure may be reduced in such a degree that, despite the employment of a superheater, the nominal tractive effort of the engine is unchanged. In this case the boiler maintenance and general running costs must be substantially reduced, but no more tractive power is available than previously. Third, as is most commonly the case, both of the foregoing advantages—increased haulage capacity and economy in working—may be secured in a reduced degree by a combined increase in cylinder diameter and reduction in the working pressure. In this way, therefore, is explained the moderate but marked average reduction of working pressures which characterises the tables in this article as compared with the previous table of non-superheater locomotive dimensions; we shall have

Digitized by Google

better opportunity of judging the effects on tractive power when the latter subject comes up in its turn for discussion in a later issue.

A few notes on the practice of individual companies may be of interest. The most noteworthy features of the tables are, of course, the figures relating to the Great Western Railway. Even prior to the introduction of superheating a standard pressure of 225 lbs. per square inch for all the Great Western six-coupled express engines was a boiler maintenance must be a costly item in the locomotive expenses of the Great Western Railway. In this connection I hope to take up briefly the question of locomotive department expenses in the next issue, so we need not now devote more attention to that aspect of the matter.

If this, however, be the debit side of the ledger, we have on the credit side the really astonishing work that is performed on the Great Western main line. While I should be

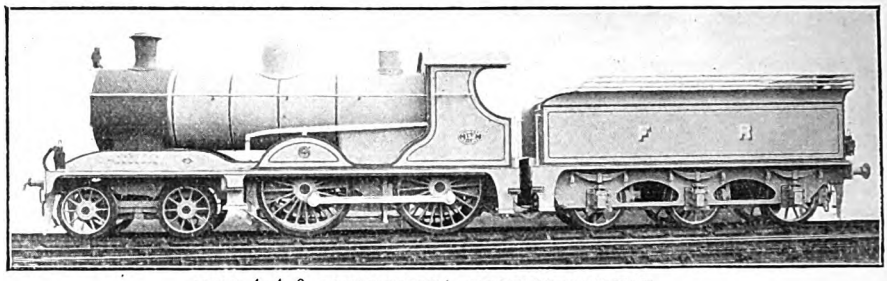
FOUR-COUPLED ENGINES.

Type.	Railway.	Typical engine.			Working Pressure.	Diagram of Driving Wheels.
		No.	Name or Class.	Superheater Employed.	lbs. per sq. in.	ins.
4-4-2	G.N.R.	1452		Schmidt	150	79½
	L.B. & S.C.R. ..	421	(Class H2)	,,	170	79½
	N.E.R.	722	(Class Z1)	,,	160	82
4-4-0	Caledonian R. ..	120		Robinson	170	78
	G. & S.W.R. ..	131	(6 ft. class)	Drummond	180	72
	G.C.R.	429	*Sir Alexander Henderson*	Robinson	160	81
	G.N.R.	51	(Class D1)	Schmidt	160	80
	G.N.R. (I.) ..	174	*Carrantuohill*	,,	165	79
	G.S. & W.R. ..	341	*Sir William Goulding* ..	,,	160	79
	G.W.R. ..	3818	*County of Radnor* ..	Swindon	200	80½
	,, ...	4101	*Auricula*	,,	200	80½
	L. & N.W.R. ..	2663	*George the Fifth*	Schmidt	175	81
	L. & S.W.R. ..	463		Drummond	200	79
	L. & Y.R. ..	1112	(Re-built class)	Schmidt	180	87
	Midland R. ..	483	(Re-built class)	,,	160	78½
	N.B.R.	400	*The Dougal Cratur* ..	,,	165	78
	N.S.R.	38		,,	160	72
	S. E. & C. R. ..	781		,,	160	80
4-4-4T	N.E.R.	2143	(Class D)	Schmidt	160	69
4-4-2T	L.B. & S.C.R. ..	22	(Class 13)	,,	160	79½
	G.W.R. ..	2221	(6 ft. 8½ in. class) ..	Swindon	195	80½
	N.S.R.	8		Schmidt	160	72
2-4-2T	L. & Y.R. ..	227		,,	180	68

T Tank Engines.

matter to be remarked, but the maintenance of so high a pressure coupled with superheating is still more surprising. An exhaustive study of the effects of high pressure has doubtless been made at Swindon, which will be reflected in the design of the boilers and steam passages, and the undesirable effects must be greatly reduced by the use of water treated in the various water-softening plants that have been installed by the Great Western Company, but in any event inclined to award to the London and North Western Railway the palm for all-the-year round loading, such crack trains as the 10.0 10.30, 12.10, 2.0, 2.40, and 5.30 p.m. expresses *ex* Euston, for instance, loading almost daily to 400 tons or over, there is no question that "peak" loading is seen to the most marked degree on the summer services of the Great Western Railway. I described a run in these columns last January with an unpiloted load of 520 tons, and others will be

Digitized by Google



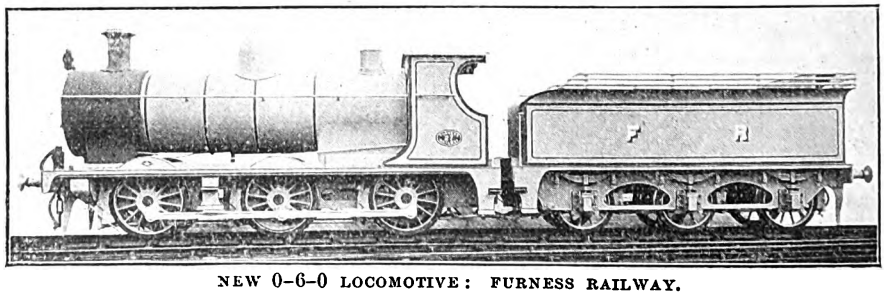
NEW 4–4–0 LOCOMOTIVE: FURNESS RAILWAY.

Built by the North British Locomotive Co., Ltd., to Mr. W. F. Pettigrew's designs. Cylinders, 18 in. by 26 in.; coupled wheels, 6 ft. diam.; heating surface, 1,246 sq. ft.; grate area, 20·5 sq. ft.; steam pressure, 170 lbs. per sq. in.; weight of engine and tender, 85 tons.

described presently with loads at the same figure, on which the fastest schedules for which the Great Western Railway is famous were observed without assistance. On a line of this character, subject to sudden rushes of traffic, this ability on the part of the engines to tackle practically anything in the matter of load must be of the greatest value to the traffic department, and doubtless in this way the ledger account is well balanced. Even 225 lbs. per square inch is not an extravagantly high pressure, many locomotives on the Continent being pressed to this figure, or even 235 lbs., but this is generally in conjunction with compounding, which is usually ineffective for fast and heavy passenger service at a lower pressure.

Generally speaking, 200 lbs. per square inch may be taken as a maximum working pressure for locomotives in this country, more especially when the latter lack superheater equipment, or possess only a moderate or low degree superheater. As will be seen, the two 4–4–0 and the 2–6–0 express types and the 2–6–2 tanks of the Great Western Railway work at this pressure, as also the 4–4–0 and 4–6–0 engines of the London and South Western Railway fitted with the Drummond steam-dryer, while the 4–4–2 tanks of the Great Western Railway have boilers pressed to 195 lbs. per square inch. The 6 ft. 4–4–0 engines of the Glasgow and South Western Railway, also equipped with the Drummond apparatus, work at 180 lbs. per square inch.

We now come to lines which have not modified their working pressures, even though adopting the Schmidt or Robinson superheaters, with high degree superheat. Of these the London and North Western Railway is the most important example, the standard pressure of 175 lbs. per square inch having been retained in the new superheater engines, so that all the advantages of superheating are available for the increase of the tractive effort. This, again, is a line where the locomotive work with tremendous loads is consistently fine; many records of such performance have appeared in these columns, and I have many more in store, waiting a suitable opportunity. It is understood, however, that the severe grade involved in starting from Euston, and before the effect of superheat is ordinarily available,



NEW 0–6–0 LOCOMOTIVE: FURNESS RAILWAY.

Built by the North British Locomotive Co., Ltd., to Mr. W. F. Pettigrew's designs. Cylinders, 18 in. by 26 in.; coupled wheels, 4 ft. 7½ in. diam.; heating surface, 1,246 sq. ft.; grate area, 20·5 sq. ft.: steam pressure, 170 lbs. per sq. in.; weight of engine and tender, 82¼ tons.

Digitized by Google

has largely governed the retention of the standard pressure on London and North Western superheater engines. The Great Eastern and Lancashire and Yorkshire Railways, also, have retained the previous standard pressure of 180 lbs. per square inch in the case of the new 4–6–0 engines, and the noted for their work with heavy loads, even though these figures represent a small reduction on the pressures previously standard. Coming down the scale, past the engines working at the average figures of 160 to 170 lbs. per square inch. we have at the bottom of the list the Great Northern superheater

SIX-COUPLED ENGINES.

Type.	Railway.	Typical Engine.			Working Pressure.	Diagram of Driving Wheels.
		No.	Name or Class.	Superheater Employed.	lbs. per sq. in.	ins.
4-6-2	G.W.R. ..	111	*The Great Bear*	Swindon	225	80½
4-6-0	Caledonian R. ..	903	*Cardean*	Schmidt	175	78
	G. & S.W.R. ..	129		,,	165	78
	G.C.R.	423	*Sir Sam Fay*	Robinson	160	81
	G.E.R.	1500		Schmidt	180	78
	G.W.R. ..	4041	*Prince of Wales*	Swindon	225	80½
	,,	2934	*Butleigh Court*	,,	225	80½
	L. & N.W.R. ..	2222	*Sir Gilbert Claughton* ..	Schmidt	175	81
	,,	819	*Prince of Wales*	,,	175	75
	L. & S.W.R. ..	447	(6 ft. 7 in class)	Drummond	200	79
	,,	482	(6 ft. class)	*Schmidt	180	72
4-6-0M	Caledonian R. ..	179	(5 ft. 9 in. class)	Robinson	170	69
	G.C.R.	4	*Glenalmond*	,,	160	67
	N.E.R.	782	Class S2	,,	160	73¼
2-6-0M	Caledonian R. ..	37		Schmidt	160	60
	G.N.R.	1630	(Class H2)	,,	170	68
	,,	1640	(Class H3)	,,	170	68
	G.W.R. ..	4331		Swindon	200	68
	L.B. & S.C.R. ..	337		Robinson	170	66
4-6-4T	L.B. & S.C.R. ..	327	*Charles C. Macrae* ..	Schmidt	170	81
	Mid. (L.T.S.) R.	2100		,,	160	75
4-6-2T	G.C.R.	165		Robinson	160	67
	L. & N.W.R. ..	2667		Schmidt	175	68½
	L.B. & S.C.R. ..	326	*Bessborough*	,,	170	79½
2-6-2T	G.W.R. ..	3121	(5 ft. 8 in. class)	Swindon	200	68

M Mixed Traffic Engines.
T Tank Engines.
* Certain of these engines have the Robinson superheater.

rebuilt 4–4–0 express and 2–4–2 tank engines respectively, similarly with striking results from the performance standpoint.

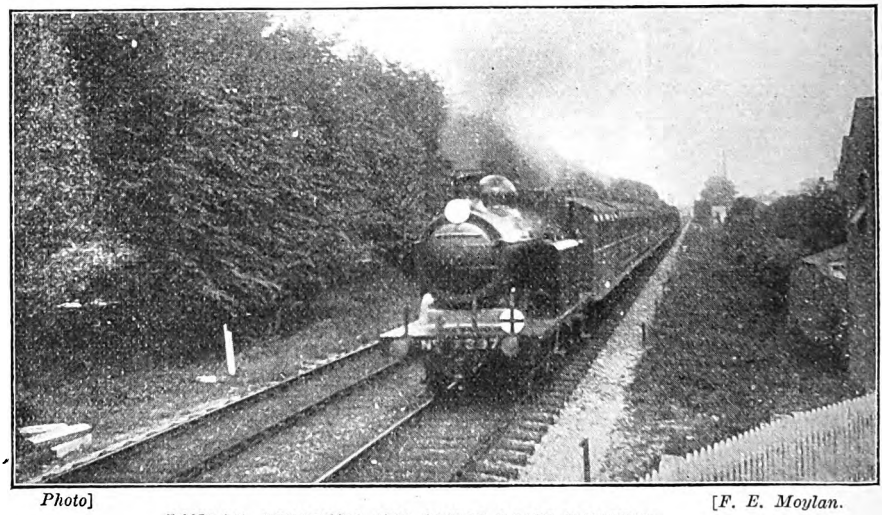
Of remaining types the new London and South Western 4–6–0 engines, working at 180 lbs. per square inch, and the Caledonian "Cardean" class, whose boilers are now pressed to 175 lbs. per square inch, are both "Atlantics," with a working pressure of only 150 lbs. per square inch. Here maximum economy in working and maintenance has been secured at the expense of any increase of nominal tractive effort, the latter figure being practically identical in the case of both superheater and non-superheater "Atlantics." In this case, therefore, an increase in cylinder

Digitized by Google

diameter was exactly neutralised by a reduction of 25 lbs. per square inch in working pressure. It would be highly interesting to know at what point in the scale, between the extremes in practice of the Great Western and Great Northern Railways, is found the exact balance between tractive power and economy in working and maintenance that produces maximum efficiency.

Having made extended reference in the foregoing remarks to Great Western practice, I cannot do better than direct attention to a number of notable examples of Great Western performance. In this matter I am indebted to the kindness of correspondents, who supply me with more details of runs than I can ever hope to give adequate publicity to in these columns. From these runs—among which, I may mention without surprising anyone, the Great Western and London and North Western lines jointly secure the most representation—I have selected seven made on the 11 a.m. express from Paddington to Bristol, which well illustrate the extraordinary tractive powers of the Great Western six-coupled express engines, both two cylinder and four-cylinder. For runs 2, 3, 5 and 7, together with a most interesting letter accompanying them, I have to thank the writer of the excellent article of "Heavy Express Work between Paddington and Exeter," which appeared in the RAILWAY MAGAZINE for March, 1912, and to which I have referred on several occasions in these articles. Runs 1 and 4 reach me from a Scarborough friend, and run 6 from a London correspondent.

The 11 a.m. *ex*-Paddington, which now rejoices in the title of "Bath Spa Express," is one of the four two-hours expresses between London and Bristol, the average scheduled speed for the 118⅜ miles' journey *viâ* Bath being, therefore, 59·2 miles per hour. The Bath portion is slipped in virtually "even time" from London—106⅞ miles in 107 min. The old schedule, on which runs 2, 3 and 5 were timed, gave passing times 1 min. later at Southall and Slough, 2 at Twyford and Reading, 2½ at Didcot and 3 at Swindon and Chippenham, the 12⅞ miles thence to Bath being only allowed 11½ instead of 14 min., and the 11⅜ miles on to Bristol 12½ in place of 13 min. The present modification of the schedule is evidently intended to discourage excessive speed from Wootton Bassett down to Bath, and to allow of the required service slack being made through the latter town. For about ten months of the year the train loads heavily, as it forms the principal morning express (after the "Riviera Limited") to North and South Devon. From the middle of July to the middle of September, however, the portion for Exeter and beyond is arranged to leave Paddington at 11.10 a.m., and to run direct to Exeter, *viâ* Westbury, and the 11 a.m. train then becomes a more "local" express to Bristol and Weston-super-Mare only.



Photo] [*F. E. Moylan.*

LONDON, BRIGHTON AND SOUTH COAST RAILWAY.

1.10 p.m. Sunday train *ex*-Victoria and London Bridge, between Worthing and West Worthing. 0–4–4 tank engine, No. 397.

Digitized by Google

Run No. 1 was made during the summer months, and the load was therefore light, consisting only of seven 8-wheelers, five of which were of the 70-ft. stock. With such a trifle as this *Polar Star* merely played, gaining on time despite five checks. At Old Oak Common permanent way work necessitated a reduction of speed to 35 miles per hour, but a rapid acceleration on the level was recorded to 60·8 at Southall and 69·2 at West Drayton. A string of signal checks followed, two at Slough and Burnham Beeches being slight, but a third at Taplow very severe. With all these hindrances, however, the speed rose again to 73·7 miles per hour before Reading, which was passed only 2¼ min. late. Between Reading and Didcot a rate of 72·5 miles per hour was sustained for some distance, the time of 14 min. 58 sec. for this level length of 17⅛ miles being exceedingly fine. Signals at Shrivenham were again adverse, speed being reduced to 30 miles per hour, but after Swindon a great spurt was made, the maximum speed on the short 1 in 100 descent to Dauntsey being 80·3 miles per hour, and on the subsequent sharp fall to Box 76·3, with a minimum speed of 64·2 on the faint rise to Corsham. The main train probably passed Bath in 104 min. from London, 3 min. before time, and an allowance of 4 min. for the five checks errs, if anything, on the moderate side.

The second run was an excellent example of average running on this train, the engine in this case being No. 2977, *Robertson*, one of the two-cylinder batch. A booking of 11 min. for the 9⅛ miles out to Southall is inclined to be of the "counsel of perfection" order with any load at all heavy, but it is worthy of note that on this run only 11½ min. were taken for this initial distance. "Even time" had been all but attained at Reading, but signal delays supervened at Goring and, later on, at Swindon, the latter reducing the speed to 20 miles per hour. The start from Paddington had been 2 min. late, but, despite these delays, the train was barely 2½ min. late at Swindon, and a maximum speed of 75 miles per hour on Dauntsey bank resulted in Bath being passed ¾ min. early. A severe check at St. Anne's Park did not prevent the arrival being effected at Bristol dead on time, the gross time for the 118¾ miles being 118 min. 9 sec., and the net not more than 114½ min.

Run No. 3 was really phenomenal in character, the engine being again of the 2-cylinder type, No. 2904, *Lady Godiva*. A good percentage of the stock on this occasion was of the earlier clerestory type, so that the increase of 3 vehicles was not accompanied by quite a proportionate increase in weight, but still a gross load of 320 tons is no featherweight on a booking of this character. The start of the run was seriously hampered by fog, severe signal checks from this cause being encountered at Acton, Southall East, West Drayton and Taplow. From the last-named point, however, *Lady Godiva* picked up magnificently. At Twyford the speed had risen to 69·2 miles per hour; the 17⅛ miles from Reading to Didcot were covered in 14 min. 44 sec., at an average speed of 69·6 miles per hour; and the 24⅛ miles from Didcot to Swindon with a slightly adverse grade throughout, mostly at 1 in 754, in 21 min. 16 sec., at an average speed of 68·1 miles per hour. At Goring troughs, on a dead level track, the speed actually rose to 73·8 miles per hour, with a load of 320 tons behind the tender. As a result of this extraordinary effort the 63 miles from Twyford to Chippenham, booked to be covered in 61 min., were reeled off in 54 min. 41 sec., at an average speed of 69·1 miles per hour, 6 min. 19 sec. having thus been gained on one of the fastest schedules in Europe. With time now in hand, the running was now eased somewhat, but a very severe check at mile-post 103—to 15 miles per hour—encouraged further effort beyond Bath, speed rising to 68 miles per hour at Keynsham. Finally the train was stopped dead by signal just outside Temple Meads station in exactly 119 min. from London, the net time being 111½ min., or 8½ min. below that booked.

The next run—No. 4—was another excellent effort, without, however, showing quite such exceptional times. Two-cylinder 4–6–0, No. 2914, *Saint Augustine*, had an identical load of 320 tons, composed almost entirely of 70 ft. stock. The first check was encountered at Slough, where permanent way operations were in force, but from Maidenhead to Didcot brilliant work was performed. Only 9 min. 40 sec. were taken for the 11¾ miles from Maidenhead to Reading, and the ensuing stretch of 17⅛ miles of level track to Didcot was then covered in the wonderful time of 14 min. 33 sec. This involved an *average* speed on level track of 70·6 miles per hour with no inconsiderable load, but the sustained maximum for some distance near Goring was 72·5 miles per hour. After Didcot the running eased down, and schedule time was

Digitized by Google

fairly closely adhered to, despite a very severe permanent way check to 10 miles per hour in Swindon yard, and a long slack approaching Bathampton. The maximum speeds recorded were 75 miles per hour at Dauntsey, and 72·5 at Box, with an intervening minimum of 62·5 at Corsham. There was a slight loss of time on this trip, but the net time, allowing for three severe slacks, could not have exceeded 102½ min. for the 107 miles from London to Bath.

The principal interest in Run No. 5 is contained in the fact that the engine was one of the now-converted "Atlantics"—No. 2980, *Coeur de Lion*. A really heavy load was taken on this run of 355 tons. The work throughout was typically "Atlantic" in character, the start to Westbourne Park being the slowest of the series, and the work on the level being barely up to the standard of the other runs tabulated, whereas the running downhill beyond Wootton Bassett was by far the fastest. Once again the early stages of the run were spoiled by checks, the too frequent signal check at Taplow following a very severe slack to 10 miles per hour for the renewal of Hanwell Bridge. Consequently the train was over 5½ min. late

GREAT WESTERN RAILWAY 11.0 A.M. PADDINGTON TO BATH AND BRISTOL.

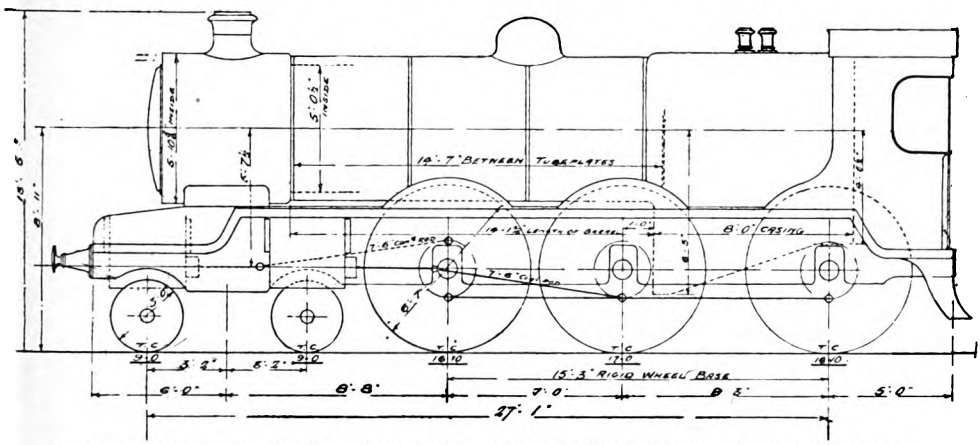
Distance.		Schedule Times.	1	2	3	4	5	6	7
	Run No.		1	2	3	4	5	6	7
	Engine No.		4005	†2977	†2904	2914	†2980	4017	4028
	Engine Name		*Polar Star*	*Robert-son*	*Lady Godiva*	*Saint Augus-tine*	*Cœur de Lion*	*Knight of the Black Eagle*	*King John*
	Engine Type		4-cyl. 4-6-0	2-cyl. 4-6-0	2-cyl. 4-6-0	2-cyl. 4-6-0	2-cyl. 4-4-2	4-cyl. 4-6-0	4-cyl. 4-6-0
	Load (axles)		28	38	47	40	46	59	64
	Load (tons)		235	285 *	320 §	320	355 ‖	505	530
Mls	STATIONS.	MINS.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.	M. S.
—	Paddington .. dep.	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1¼	Westbourne Park pass	—	3.05 *a*	2.48	3.00 *h*	3.05	3.28	—	3.12
5¾	Ealing .. .. ,,	—	—	—	9.48 *h*	—	9.38 *p*	—	9.30
9⅛	Southall .. .. ,,	11	12.50 *b*	11.30	14.05 *h*	11.53 *m*	14.28	13.30	13.25
18½	Slough .. .. ,,	20	21.45 *c*	20.20	24.12 *h*	21.58	24.18 *q*	23.00	23.15
24¼	Maidenhead .. ,,	—	28.40	—	—	28.32	—	—	29.10
31	Twyford .. .. ,,	32	—	31.46	38.19	—	37.39	—	36.10
36	Reading .. .. ,,	37	39.12	36.25 *e*	42.40	39.12	42.27	40.15	41.20
44¾	Goring .. .. ,,	—	—	45.13	50.05	—	50.43	—	50.10
53⅛	Didcot .. .. ,,	53½	54.10	53.28	57.24	53.45	58.34	57.00	58.15
66½	Uffington .. .. ,,	—	— *d*	66.47 *f*	69.14	— *n*	71.33	—	72.55
77¼	Swindon .. .. ,,	77	77.50	77.23	78.40	77.47	81.38	80.45	84.55
94	Chippenham .. ,,	93	92.07	92.15	93.00	94.05	95.30	95.15	101.10
102	Mile-post 102 .. ,,	—	—	99.26	100.35 *k*	— *o*	102.40 *r*	—	109.46
104⅝	Bathampton .. ,,	—	101.33	—	—	104.28	—	105.00	112.00
106⅞	Bath†† .. .. (slip)	107	¶104.23	104.18	107.10	¶107.42	108.43	¶107.45	‡115.05
113¾	Keynsham .. pass	—	—	111.34 *g*	114.24 *l*	—	116.08	—	—
118⅜	Bristol .. .. arr.	120	—	118.09	119.00	—	121.36	—	—
106⅞	Net { Bath ..	107	100	101¾	99½	102½	103¼	107¾	115
118⅜	Times { Bristol ..	120	—	114½	111½	—	116¼	—	—

† Present Numbering. Loads beyond Bath:—* 34 axles (255 tons). § 39 axles (270 tons). ‖ 38 axles (300 tons).
¶ Arrival time of slip portion. ‡ Arrival time of train. †† Service Slack, 30 miles per hour.
a P.W. check, 35 miles per hour, Old Oak. *b* Slight signal check, Slough. *c* Signal checks, Burnham, slight; Taplow, severe. *d* Severe signal check, Shrivenham. *e* Signal check, Goring, 30 miles per hour. *f* Check, Swindon, 20 miles per hour. *g* Check, St. Anne's Park, 20 miles per hour. *h* Signal checks, 25–35 miles per hour (owing to thick fog) Acton, Southall East, West Drayton, Taplow. *k* P.W. slack, 15 miles per hour (for ¾ mile) mile post 103. *l* Stop outside Temple Meads station. *m* P.W. check, Slough. *n* Severe p.w. check, Swindon, 10 miles per hour. *o* Long p.w. check approaching Bathampton. *p* Hanwell bridge repairs, 10 miles per hour. *q* Signals, Taplow, 30 miles per hour. *r* Signals, Bathampton, 15 miles per hour.

Digitized by Google

past Twyford. By Swindon only 1 min. of the arrears had been regained, but the 16¾ miles from Swindon to Chippenham were covered in 13 min. 52 sec., at an average speed of 72·5 miles per hour, speed touching 85 miles per hour at Dauntsey. There was now good prospect of keeping time, but a further bad check to 15 miles per hour at Bathampton effectually disposed of this, although the speed recovered to 72 miles per hour at Keynsham. Still, with these three checks, *Coeur de Lion* put up a good fight in only losing 1½ min. to Bristol, the net time being 116¼ min.

We now come to runs 6 and 7, which are striking examples of the "peak" loading to which the chief Great Western expresses are subject at holiday times. Moreover, as these runs were timed at a later date, the trains were composed almost entirely of the heaviest stock, bringing the total tonnage of the two trains, engines and tenders of course excepted, to the enormous figures of 505 and 530 tons respectively. Each train was packed to its utmost capacity with passengers and luggage. Most unfortunately, the correspondent who furnished me with run No. 6, which is unquestionably the finer of the two, only sent the barest details—in fact, no further particulars than those embodied in the table—but these are startling enough. The start was naturally slower than those of preceding trips, speed not rising to the mile-a-minute rate until the neighbourhood of Slough, which was passed 3 min. behind time. But from Slough onwards the losses on schedule were only fractional, amounting, curiously enough, to 15 sec. in each section between there and Swindon, which was passed 3¾ min. late. The sustained speed with a load of over 500 tons was, of course, extraordinary. It averaged 60·9 miles per hour between Slough and Reading, 61·4 between Reading and Didcot, and 61 between Didcot and Swindon. Of these sections the first is mainly up at the fractional inclination of 1 in 1320, the second is partly similar, and the remaining part absolutely level; but the third is more appreciably uphill, the principal grade being 1 in 754. I am inclined, therefore, to think that the work on the last stretch eq als, if it does not beat, my previous best combined load and speed record, when a 3-cylinder superheater "Atlantic" on the North Eastern Railway maintained a speed of 61·6 miles per hour on the level with 545 tons beyond the tender, and 57·7 miles per hour up a gradient of 1 in 626. Finally, by smart downhill running from Swindon to Bath, 3



NEW 4–6–0 FOUR-CYLINDER LOCOMOTIVE: GREAT SOUTHERN AND WESTERN RAILWAY.

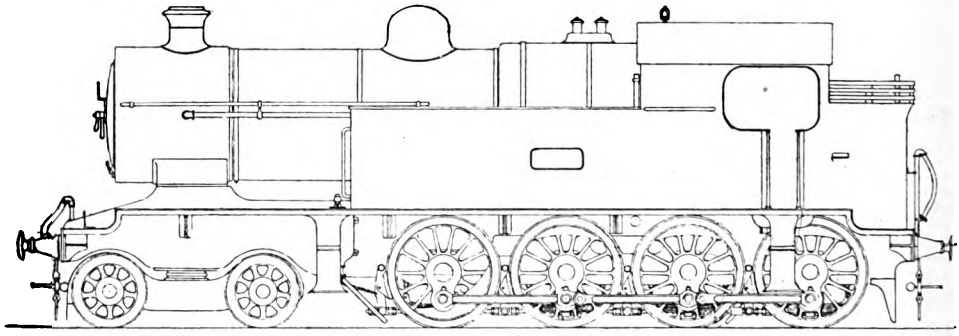
This design has been prepared by Mr. E. A. Watson, Locomotive Superintendent, and the engines are under construction at Inchicore Works. The Great Southern and Western Railway already has the distinction of being the only line in Ireland to employ the 4–6–0 type for goods tender locomotives, but in the new 4–6–0 class Mr. Watson is developing more on the lines of the standard 4–4–0 express locomotives, with four high-pressure cylinders (divided and balanced system), Schmidt superheater and other modern features. Leading dimensions are:

Cylinders (4)	14 in. by 26 in.	Heating surface—Firebox ..	158 sq. ft.
Coupled wheels	6 ft. 7 in. diam.	,, Tubes ..	1614 sq. ft.
Coupled wheelbase	15 ft. 3 in. ,,	,, Superheater	440 sq. ft.
Total wheelbase	27 ft. 1 in. ,,	,, Total ..	2212 sq. ft.
Estimated weight in working order	68 tons	Grate area	28 sq. ft.

Digitized by Google

min. of the arrears were regained, the 97¾ miles from Southall to Bath having been covered in the astounding time of 94¼ min., 1¾ min. less than schedule time, and with a load of 505 tons.

The real difficulty in running in this direction, however, with loads of this magnitude—so a correspondent informs me—is that of water supply. On a non-stop run no water is available beyond Goring troughs until Fox's Wood troughs, 70 miles further on. This explains the marked difference in times between Runs 6 and 7, as in the latter instance arrangements were made to stop the whole train at Bath to detach an unusually heavy slip portion.



4–8–0 SHUNTING TANK ENGINE: GREAT SOUTHERN AND WESTERN RAILWAY.

Designed by Mr. E. A. Watson, Locomotive Superintendent, and under construction at Inchicore Works. This engine is intended, it is understood, for duties in the goods sidings outside the Dublin terminus, where the severe gradients and the employment of methods similar to "hump" shunting call for considerable power to be exerted under non-running conditions. Leading dimensions are:—

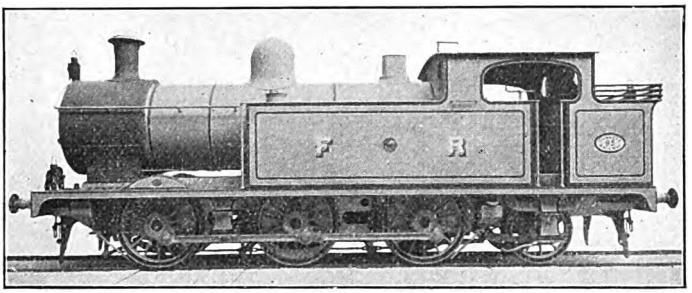
Cylinders	19½ in by 26 in.	Heating surface—Firebox ..	138·5 sq. ft.
Bogie wheels, diameter ..	3 ft.	,, Tubes ..	1,426·75 sq. ft.
Coupled wheels	4 ft. 6½ in.	,, Total ..	1,565·25 sq. ft.
Working pressure ..	175 lb. per sq. in.	Grate ares	24·8 sq. ft.
Wheelbase, rigid	15 ft. 3 in.	Water capacity	1,500 galls.
Wheelbase, total	29 ft. 1¼ in.	Coal capacity	3½ tons
Total length over buffers ..	37 ft. 10¾ in.	Weight (estimated) ..	80½ tons

This extra stop, in addition to the increased load, involved a larger consumption of water, and so, although the times of runs 6 and 7 correspond fairly closely as far as Didcot, only 1¼ min. there separating them, the driver of *King John* was compelled to take things more easily on the rise from Didcot to Swindon, on which over 3 min. were dropped. Further, the falling grades beyond Swindon were not taken so fast as usual, the schedule time between Swindon and Bath being exactly observed, with a maximum speed of only 69·2 miles per hour at Dauntsey. As a result, 8 min. were dropped on the run to Bath, although the average speed for the run from London still reached the respectable figure of 55·8 miles per hour, start to stop. The mile-a-minute rate was first reached at Slough; thence to Reading the speed fluctuated between 56·2 and 58·1 miles per hour. At Tilehurst the 60 rate was again touched, and beyond Goring 63·1 miles per hour, but from Didcot to Swindon the speed ranged mostly from 52·1 to 54·5 miles per hour. No one would dispute that this was an exceedingly fine run, but it certainly does not attain to the level of the preceding run, nor to that which I timed behind *King Harold* last summer, with 520 tons, when net time was maintained from Taunton to London. This was described in the issue for last January. With these runs in view, it would be hard to deny that the provision of a high working pressure is reflected in the enhanced merit of locomotive performance.

I have very much pleasure in giving publicity to a run, of which a Lewes correspondent has kindly favoured me with the log, behind the new Brighton 4–6–4 Colossus, No. 327, *Charles C. Macrae*. The train was the 6.35 p.m. *ex*-Victoria, and the load 6 eight-wheelers and one of the latest Pullman cars, or 200 tons in all. Clapham Junction, 2¾ miles from Victoria, was passed in 5 min. 7 sec., and a speed of 50 miles per hour had been attained, when adverse signals from the preceding 6.30 p.m. train *ex*-Victoria were encountered. So the 6 miles from Clapham Junction to Thornton Heath took

Digitized by Google

9 min. 13 sec., and East Croydon, 10½ miles out, was not passed until 16 min. 32 sec. after leaving Victoria. From here the new "Baltic" picked up wonderfully, covering the 8¼ miles of rising grades to Quarry Box in 8 min. 52 sec.—the only occasion, my friend remarks, on which he has seen the 9-min. booking between these two points observed or improved on with a load exceeding 150 tons.



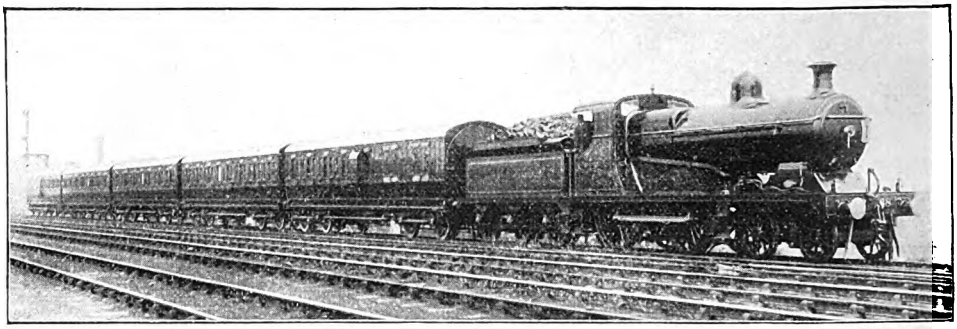
NEW 0–6–2 TANK ENGINE: FURNESS RAILWAY.

Built by Messrs. Kitson & Co., Ltd., to Mr. W. F. Pettigrew's designs. Cylinders, 18 in. by 26 in.; coupled wheels, 4 ft. 7½ in. diam.; heating surface, 1,246 sq. ft.; grate area, 20·5 sq. ft.; steam pressure, 170 lbs. per sq. in.; weight in working order, 58 tons 12 cwt.

The tunnel was entered at 56 miles per hour, and left at 64, speed increasing on the 1 in 200 descent to 75 miles per hour at Earlswood. On regaining the old main line, a further increase was registered to a maximum of 81 miles per hour at mile-post 24. This is the first occasion on which I have seen a maximum speed of 80 miles per hour or over recorded with a tank locomotive, and I should be interested to hear of the experiences of any other readers in this direction. The 7⅛ miles from Quarry to Horley were covered in 5 min. 53 sec. On the ascent of Balcombe Tunnel speed fell to exactly 60 miles per hour, but a further maximum of 78 miles per hour was reached near Hayward's Heath, although this was succeeded by a severe signal check in Folly Hill cutting on account of the preceding "motor" to Lewes. The times to this point were, from Horley to Three Bridges, 3¾ miles, 3 min. 3 sec.; from Three Bridges to Balcombe, 4½ miles, 4 min. 24 sec.; and from Balcombe to Hayward's Heath, 3⅞ miles, 3 min. 12 sec. The check, of course, ruined the remainder of the run, the last 12⅞ miles into Brighton taking 16 min. 44 sec., but even then the arrival was 1 min. 20 sec. before time, in 58 min. 40 sec. from Victoria. My correspondent estimates the net time at 55 min. The high speed was, of course, the notable feature of the run, the times of 16 min. 26 sec. for the 19 miles between posts 19 and 38, with its average of 69·5 miles per hour over an undulating road, speaking well for the tractive capacity of the new locomotive.

In conclusion, I wish to describe a run on the Caledonian Railway which is of interest in reference to the subject of the September article in that the engine was one of the large intermediate 4-6-0 type with 5 ft. 9 in. wheels. The train was the important 10 a.m. express from Glasgow (Buchanan Street) to the North, hauled by No. 913, and the load very heavy, consisting as it did of seven 12-wheelers and two 8-wheelers, or 340 tons in all. A very steep grade commences immediately on starting, but No. 913 got away well, accelerating up the 1 in 97 portion of the grade to a speed of 25 miles per hour, and passing Gartcosh, 7¼ miles, in 15 min. exactly. The sharp 6 miles of undulations from Gartcosh to Cumbernauld occupied 6 min. 20 sec., and a very cautious descent of Greenhill bank was made, no speed higher than 64·3 miles per hour being touched, with frequent checks. From Cumbernauld to Greenhill the 5½ miles took 5 min. 25 sec., but near Larbert a very severe relaying check was encountered, the 3½ miles from Greenhill down to Larbert taking as much as 5¼ min. Beyond Bannockburn we had a second bad permanent way check, so that the 8 miles from Larbert to Stirling stop took us 11½ min., giving a total of 43½ min. from Glasgow. The net time, however, was rather less than the scheduled 40 min. for this 30¼ miles journey. A fine start was made from Stirling, a speed of 47 miles per hour being attained in the 2 miles, but little easier than level, to the bridge over Allan Water. The 6 miles ascent at 1 in 88-100 up to Kinbuck was then tackled in excellent style with this heavy load, the minimum speed on the 1 in 100 being just above 30 miles per hour—30·4, to be exact—while on the 1 in 88 the rate fell to 27·1. Dunblane, 5 miles, was passed in 9 min. 20 sec., and Kinbuck, 7½ miles, in 15 min.

Digitized by Google



NORTH STAFFORDSHIRE RAILWAY.

New bogie train, consisting of two third-class brake vans, with four passenger compartments in each, two corridor lavatory seven-compartment thirds, and one first-class six-compartment corridor lavatory carriage, recently placed in service.

10 sec. from Stirling. Most unfortunately, a third permanent way caution befell us at Greenloaning; under these conditions a time of 13 min. 25 sec. for the gradually rising 9¾ miles from Kinbuck to Gleneagles was very good. At Gleneagles we slipped a coach, reducing the load to 310 tons, but the reduction was of no moment, in that the remainder of the journey is steeply downhill. A speed of 69·2 miles per hour was quickly attained, but thereafter the brake was applied constantly until the foot of the incline, the 11¾ miles from Gleneagles to Forgandenny taking 11 min. 10 sec., and the last 4 miles to Perth (ticket platform) 4¼ min. So we had run from Stirling, 33 miles of heavily graded road, in 44 min., but the loss of a minute on schedule time was more than accounted for by our misfortune at Greenloaning.

I am reminded that the North Eastern 4–4–0 engines of class G1 (the "Waterburys") have coupled wheels 6 ft. in diameter, and not 5 ft. 6 in., as stated last month.

Digitized by Google

From Antofagasta (Chili) to La Paz (Bolivia).

(No. II.)

By S. M. WHITTON.

VERY soon after reaching the Borax Lake the volcano known as *Ollague* comes into view, and, as the train passes half way round the base, incidentally taking three hours in which to do it, I had ample time to examine it closely with my glasses. The mountain came more up to my expectations as a volcano than did *San Pedro*, though at first I thought I was again to be disappointed.

When first seen, *Ollague* looks no different from hundreds of other mountains round about, except that, like *San Pedro*, it is detached from the rest of the range, and is considerably higher than its neighbours; even with the glasses I could detect no smoke. However, as we gradually got round the base, I began to distinguish the summit, which was quite distinct from the clouds around. Then, as the train entered a cutting, I lost sight of the volcano altogether for about ten minutes or so, and when we again emerged a column of sulphurous smoke could distinctly be seen rising.

The curious fact about *Ollague* is that, unlike most volcanoes, the crater is not at the summit, but about two-thirds of the distance up the side, which explains why, when we approached from the farther side, no smoke was visible. This monster towers to a height of almost 20,000 ft.

Not far distant from Ollague is what I thought the most wonderful mountain of all. Unfortunately, I have been unable to ascertain either its name or height, but it appeared to be about 18,000 ft. When first seen there appears to be nothing remarkable in it, but on getting round to the other side it presents a most remarkable sight.

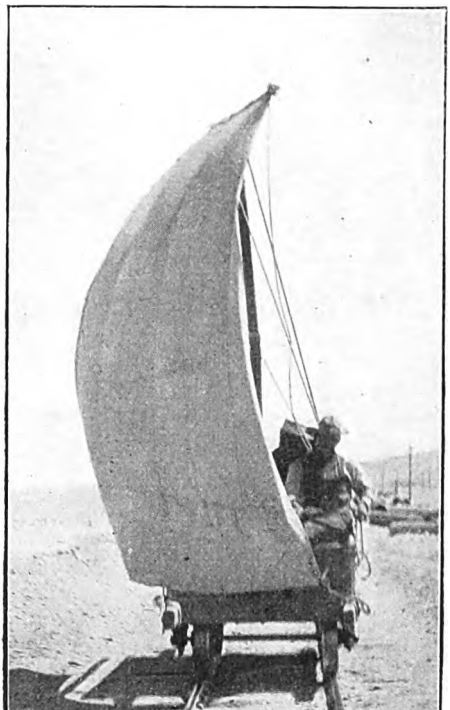
At some distant time a great volcanic upheaval has literally blown the whole of one side out, and the ground for miles around is strewn with huge fragments, which lay just as they fell, some half-buried in the ground. The interior of the mountain thus exposed to view presented a most glorious sight, lit as it was by the rays of the late afternoon sun. All the colours one could think of were there, an effect caused by the various strata of ore and rock, the predominant colour being the green of copper ore. Although Nature appears to make up for lack of vegetable colours in this lonely wilderness, all the mountains being blazes of reds, greens, and blues, nowhere have I seen such a fine effect of what I might call mineral colours.

This freak of nature closed the sights for the day, although I must say that a finer sight could not be imagined than the expanse of mountains all around, with their snow-clad summits dyed red by the rays of the setting sun, the lower portions seeming to float on a sea of purple haze, which slowly turned to inky shadows as the land became enveloped in the night. As is well known, the sun sets very quickly in the tropics and, the moon being already up, as the red glow faded from the mountain tops, so they became bathed in silvery moonlight.

As there was nothing much else to do, I retired to the day saloon and became engaged in a game of draughts until dinner was announced. Just as we reached the coffee stage the grinding of the brakes and the hurried exit from the "diner" of a few of the passengers betokened that we were drawing up at our first stop of importance over the Bolivian border, Uyuni, so hastily draining my cup I made a rush for my "cabin" for my overcoat, and as we came to a stop skipped on to the platform for a walk, and promptly ran into a little crowd of railway friends stationed there.

Uyuni being a small town, it can be quite understood that the advent of the "nocturno" is an event only to be celebrated by the English exiles by a raid on the "buffet" of the "diner." Luckily for my pocket (about a dozen "good friends" were very attentive to me!) the train was still very late, and instead of making a fifty-minute stop was off again as soon as a change of engines had been made, so that my friends had to bundle out again very quickly with many grumblings. Having seen the station lights disappear, I quickly made my way to

Digitized by Google



PERMANENT WAY TROLLEY PROPELLED BY SAILS.

the " dormitorio," and was soon passing my second night " on board," in slumber.

My dreams during the night were of the North Pole and kindred chilly spots. I awoke frozen to the bone, for we had been travelling through an Arctic night in these frozen altitudes without steam heating, the apparatus in the coach having gone wrong. Every drop of water was frozen solid, including that in the water-bottle, which will give some idea of how intense the cold is in these altitudes at night.

Looking out of the window, and with chattering teeth, I beheld an undulating snow-clad plain, with mountains in the distance. To wash was impossible, so, hastily dressing myself, I shivered my way along down draughty corridors on my way to the dining car for a cup of hot coffee. Luckily, this coach was warmed, and there I stopped until we reached Oruro, the terminus of the Antofagasta and Bolivia Railway.

As soon as the train drew up it was invaded by hordes of Indians, all jabbering in their own tongue, but making it quite apparent that they were there with the object of carrying our bags across to the waiting Bolivia Railway train, in which the second stage of the journey to La Paz is made. Hastily gathering my belongings together, I gave them in charge of one of the Indians, ridding myself of the rest by means of a few lusty kicks, when each and every one of the unchosen began to argue with me in his own tongue (about as intelligible to me as Yiddish) his own particular reasons as to why he should carry my bag and no one else !

Having over an hour before me in which to look round before the B.R.C. train started, I saw my traps transferred, and then made my way to the Traffic Inspector's office (the gentleman in charge being a friend) for a wash. This being concluded, I proceeded on a voyage of discovery, and observed our special luggage van being transferred bodily from narrow to broad gauge bogies by means of a crane.

I was astonished at the size and importance of Oruro as a railway depôt, the sidings covering an immense expanse of ground, all being fitted with triple rails to accommodate both Bolivia Railway (metre gauge) and Antofagasta and Bolivia Railway stock. Besides being the terminus of the two railways, it is also the junction for Cochabamba (B.R.C.), and such a scene of railway bustle and activity I have not seen since leaving England.

Oruro is situated in the centre of a flat plain between the two great " corderillas " of the Andes, and lies at an altitude of 12,100 ft. It is the centre of an important mining district of Bolivia. The houses are mostly of one storey only, and are built of " adobe " or mud bricks.

An object of interest to the newcomer is the Indian market, with its old Indian church at one side. This being my first real glimpse of Bolivia, I was naturally more than a little interested in all I saw, the picturesque appearance of the place at once appealing to me.

The gaily dressed Indians in the market with all manner of quaint foodstuffs and gaudy knick-knacks for sale on their stalls, and the herds of llamas, all came in for a good stare from me.

As I was now a servant of the Bolivian section of the Antofagasta Railway Company I naturally took a good look at the train in which I was to continue my journey, and could not help but admire the roominess of the broader-gauge coaches.

Digitized by Google

Prompt to time we started, and were soon swinging along at a good pace over practically level ground, and on every hand I found the scenery refreshing, for, although still at an altitude of about 11,000 ft., the country is fertile. Everywhere could be seen green fields, with Indians at work in them, whilst occasionally we thundered over bridges which span the numerous rivulets and irrigation ditches. It was almost English, and although I fully enjoyed the more awe-inspiring mountain scenery we had recently passed through, the sight of these smiling fields, perhaps, gave me more pleasure than anything.

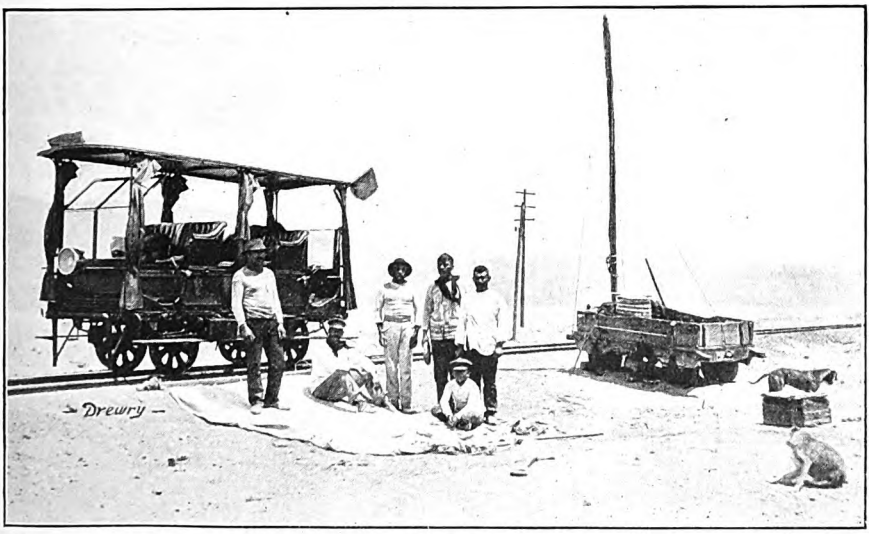
As this is country inhabited almost entirely by Indians, there are no big towns, although numerous villages could be seen dotted over the countryside, each with its tiny church. Nowhere did I notice a stone building, every hut being constructed of "adobe" or sun-dried mud bricks. It was curious, also, to note that the majority of the thatched roofs of these Indian dwellings were surmounted by a rough wooden cross, intended to announce to all and sundry that the occupants are Christians, but, I believe, more especially to drive off "evil spirits."

For the first time, too, I was able to observe how generally used as a beast of burden the llama is in this country. At hardly any time were we out of sight of a herd of these curious animals, either grazing or engaged on the task of carrying merchandise. It was quite common to observe a mixed bunch of llamas, mules, and donkeys plodding along together, with their Indian drivers, often women, carrying loads of ore from distant mines to the railway. At the various wayside stations I also had a good opportunity to observe the Indians.

The "Aymará" Indian is the most met with in these parts. They are a docile and hard-working people. Their enjoyments—or, rather, vices—are the chewing of "coca," the leaf from which "cocaine" is extracted, and the drinking of crude alcohol—methylated spirit, we should call it!

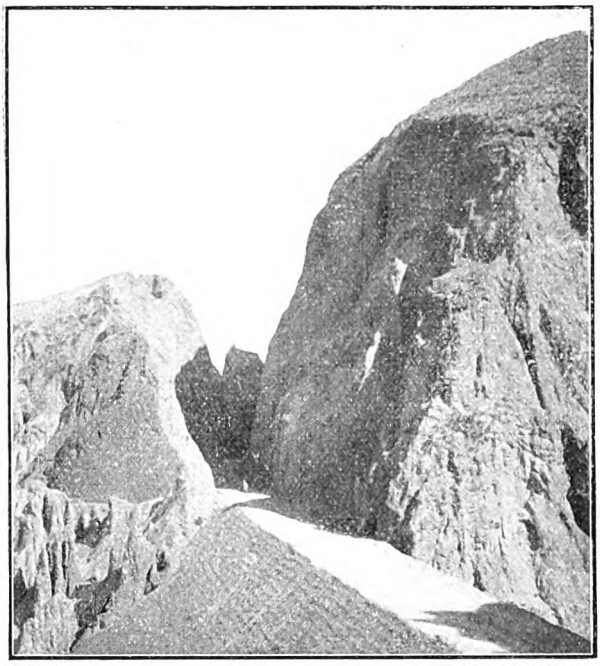
Although I have never tried the former drug, there are many Englishmen in Bolivia addicted to the habit, and they swear that it is the finest thing for keeping up one's strength ever discovered. It is said that under its influence it is possible to go for twenty-four hours without touching food, working hard all the time, and yet feel no ill effect afterwards. Whether this is so I do not know, but it is, nevertheless, a fact that under its influence the Indians undergo feats of physical endurance which would be considered impossible in Europe.

One must live in these altitudes to properly appreciate the performances of the Indians which are part of their everyday life. Often and often they will travel for a whole day across rough country with a heavy load, keeping up a steady trot all the time, never stopping for rest or food, their only sustenance being an occasional mouthful of "coca." Really it is marvellous, and



20 H.P. DREWRY CAR USED ON THE ANTOFAGASTA (CHILI) AND BOLIVIA RAILWAY.
The view is taken at an altitude of 12,000 ft. above sea level. The old sailing trolley, illustrated on another page, is shown, with sail furled, to the right.

Digitized by Google



Photo] [*S. M. Whitton.*

PREPARING FOR THE NEW RAILWAY FROM VIACHA TO LA PAZ, BOLIVIA RAILWAY.

yet their pay, irrespective of what work they do, is one dollar per day (1s. 6d.)—often less; and it must be remembered that it costs a European ten pounds per month to live here, to understand how small this amount is for a day's work.

However solemn the Aymará Indian may be, his love of gaudy colours is apparent in his dress. One pictures an Indian wearing nothing much more than a necklace! With this race, however, it is not so, it is far too cold at night to permit of a "wood nymph" style of dress. The men wear short trousers (slit at the bottoms like a divided skirt), sandals, and a thick "poncho" of gaudy colours. The "poncho" is a curious garment, very like a huge blanket with a hole in the middle, which is slipped over the head, the whole garment then draping the figure almost to the knees.

With the women it can be truthfully said that their "outstanding" feature is their petticoats. Whether true or not, I cannot say, but it is said that they put on a fresh petticoat for every year of life, the old ones remaining! The result is that their skirts are of the crinoline style. They reach to just below the knee, and as these various skirts are of every imaginable colour—brilliant violets, greens, reds, blues and yellows—the effect when they stoop down is, to say the least, startling.

Usually yellow boots, decorated with tassels, and which reach to the knee, are worn, a brilliant shawl with long fringes covers the bodies, and their heads are surmounted with a round white straw hat, very like a masculine "bowler," but with a flat brim—and their fashions never change. They carry their babies on their backs, and are, I think, the most picturesque people I have seen.

Comparatively speaking, it is quite a short run from Oruro to Viacha, for, leaving Oruro at 9.30 a.m., we reached Viacha soon after three, this particular section representing at the time of my journey the only portion of the Bolivia Railway fully working, the other branches from Rio Mulato to Potosi, from Uyuni to Tupiza, and from Oruro to Cochabamba being still under construction.

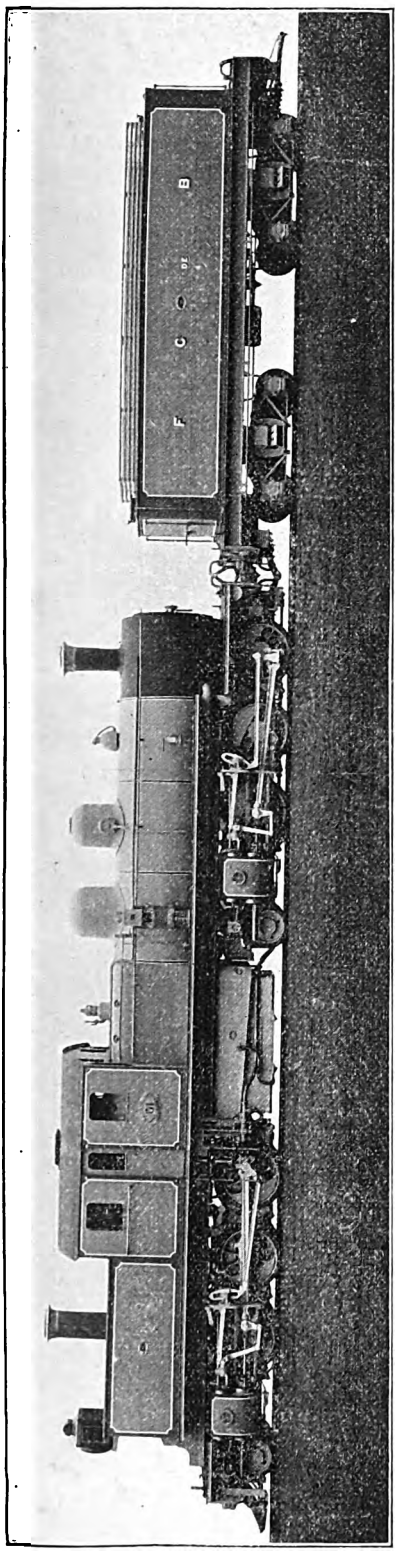
Yet another change of system (but not of coach) is made at Viacha, from the Bolivia Railway to the Guaqui–La Paz Railway. Viacha station, although the place it serves is quite a village, might be described as the Clapham Junction of South America. Here converge the lines of no fewer than four different companies, all being international lines, of which three are working and one under construction.

They are: the Bolivia Railway, Arica-La Paz Railway, Guaqui-La Paz Railway, and the new A. & B. Railway line which when completed will give "our" line an independent entrance into La Paz.

The Arica-La Paz Railway is the shortest route to the coast (22 hours), and is a Chilian State line giving direct access to that country's port, Arica. The Guaqui-La Paz Railway is really controlled by the Southern Railways of Peru, and links up La Paz with Guaqui, on the shores of Lake Titicaca (the highest navigable lake in the world), from which spot a line of steamers owned by the railway take the passenger to the rail-head on the Peruvian side, where they resume the journey to the port of Mollendo in that country. It is the Guaqui-La Paz Railway who own what is at present the only entrance by rail into Bolivia's capital, and which I shall shortly describe.

With regard to the Antofagasta and

Digitized by Google



A NOVEL ARTICULATED LOCOMOTIVE IN USE ON THE BOLIVIA RAILWAY, WORKED BY THE ANTOFAGASTA (CHILI) AND BOLIVIA RAILWAY. Built by Messrs. Beyer, Peacock & Co., Ltd.

Bolivia Company's line, the engineers have accomplished a task hitherto believed impossible, that of bringing steam-drawn trains into La Paz. The difficulties which had to be surmounted were tremendous, and included the excavation of the deepest railway cutting in South America.

The Guaqui train arrived soon after us, and our coaches being coupled on, with the exception of the dining car, no time was lost in commencing the two hours' run to the "Alto" or "high" station at La Paz. Quickly we began to draw near to the "Alto," once more entering a rugged, mountainous country, yet no sign could be seen of a city. On the other hand, it was the most miserable looking country we had passed through for a long time.

It was really most weird to know that we were within a short distance of the capital of a country and yet able to observe not the slightest sign of it, though its "guardian," the famous "Illimani," third highest of the Andes peaks, could be plainly seen.

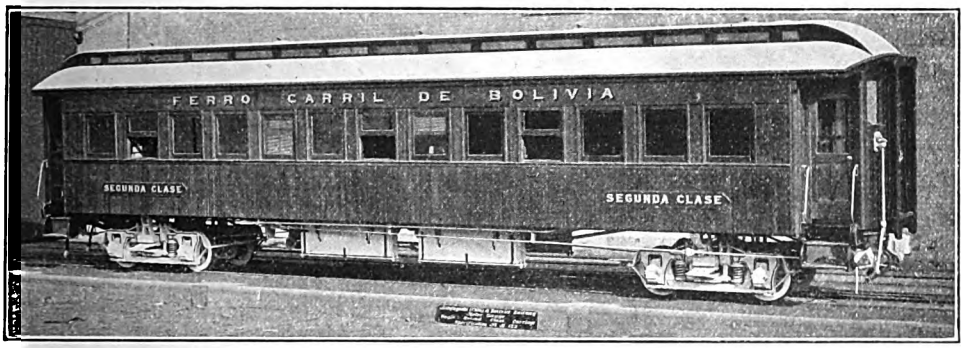
Arriving at the "Alto" I took a few strolls along the bleak wind-swept platform, whilst the engine was being changed for an electric locomotive, looking in vain for a sign of our goal. I could barely restrain my impatience at even this brief delay, but soon we were off. Almost immediately we began to descend, the heavy train thundering along at great speed. With a "shrill hoot" we rounded a curve and plunged into the obscurity of a deep cutting, then flashed into daylight again, and I gasped, whilst my hands tightened on the rail to which I was holding as I stood on the platform of the rear coach.

Do not think I am attempting the "dramatic." I defy anyone, seeing La Paz for the first time, to repress a gasp of wonder. For the first few moments the train seemed to hang on the edge of a precipice, and 1,500 ft. below lies the town of La Paz, like a dream city, as, indeed, in my case it was. See it as I did, in the rays of a setting sun, with "Illimani" towering over it, its snows dyed blood red by the crimson rays, and you will agree with me that it presents one of the most lovely sights ever beheld by the fortunate traveller.

Although the descent is 1,500 ft., accomplished in five-and-a-half miles of track, the journey took us just 15 minutes. And every one of those minutes was a delight; as we wound our way down the steep hill sides, so a different view of the city was

Digitized by Google

Digitized by Google



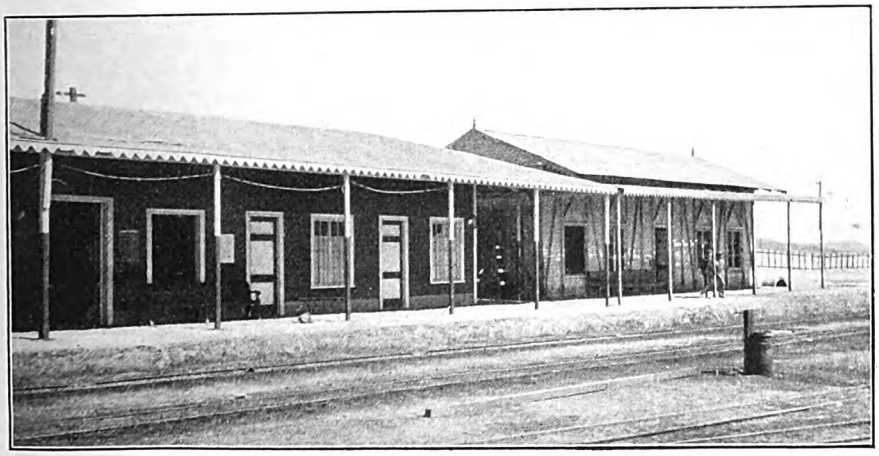
SECOND-CLASS CARRIAGE, ANTOFAGASTA (CHILI) AND BOLIVIA RAILWAY.

As I have already said, La Paz lies in a natural basin more or less 1,500 ft. deep, at an elevation of 12,000 ft. above sea level, and is the highest capital in the world. Founded very soon after the Spanish Conquest by one of the followers of Pizarro, it still contains many interesting old buildings, adorned with magnificent stone carvings. Not the least noteworthy of these is the handsome, weather-scarred church of San Francisco.

The interior, as well as the exterior, bears witness to the patience and zeal of these early Christian conquerors, who scattered devastation and death with one hand, whilst they raised magnificent temples with the other! Much of this carving is truly wonderful, and must have taken years to complete. This church is at present the cathedral, although a handsome edifice is being erected to take its place on the main "Plaza" of the town. This building has already been in course of construction for eighty years or more, and it is estimated that it will yet be many years before even the building itself is completed.

Of the more modern buildings the most noteworthy is the Government House, a handsome building of white stone, which is surmounted by a tall clock tower having a most decided outward tilt! This building takes up the whole of one side of the principal "Plaza," a delightful little spot containing some beautiful marble statuary and a huge monument set up to commemorate the founding of the Bolivian Republic. In the summer this "Plaza" is ablaze with the blooms of roses and geraniums, the sidewalks being hedged with these shrubs.

We are indebted to the Antofagasta (Chili, and Bolivia Railway Company, Messrs. Beyer) Peacock & Co., Ltd., the Gloucester Railway Carriage and Wagon Co., Ltd., and the Drewry Car Co., Ltd., for illustrations additional to those supplied by the author.



SIERRA GARDA STATION.

Digitized by Google

Leaves from the Log of a Locomotive Engineer [No. XXV.].

By ROBERT WEATHERBURN.

COMPENSATION for injuries, although looked upon at first as a heavy burden, is not altogether to the disadvantage of the employer, and has acted adversely on Trades Unions, for, in order to minimise accidents, the greatest discretion is now used by employers when taking on men, to see that they are not only well within the age limit, but also sound in sight, hearing, and limbs, where formerly some allowances were made. This has had the effect of disqualifying a serious percentage, and forcing them prematurely on the Union funds, already overtaxed, with heavy subscriptions and oppressive levies, which year by year tend to make the Unions more unpopular.

Notwithstanding every precaution, misstatement and malingering, happily not frequent, are not unknown in railway service. I have known unshamed attempts to pass off old sores, football hurts, and even injuries resulting from drinking bouts, as accidents occurring in the works.

I always had a profound respect for workmen, who by joining clubs and benefit societies make a sensible provision against the days of sickness or incapacity in other respects, and have previously advocated such whenever possible, even to the extent of an income during such periods, equal to, or slightly in excess of the regular wages, as the sick need more comforts. But with the unprincipled, it is a great temptation to act fraudulently, or without just cause. The unblushing audacity of claiming such pay for a bruised finger nail, or a trifling cut or abrasion that a school boy would make fun of, creates the necessity of knowing how each man stands in regard to society membership. The old saying of the club doctor, " that he had some chance of curing the man in two Societies, but found the difficulty increase with the numbers " is not far wrong.

Without wishing to be in the least ungenerous, I openly aver that where one case of malingering comes to light, from three to four are successful. On the other hand, how many have I known, who, inspired by the loftiest sense of duty, even when physically incapacitated, and urged to the contrary, have still presented themselves for work, even when this involved martyrdom.

Unlike contract firms, subject to, and swayed by, varying conditions of trade, railway and other large corporate bodies with regular employment to offer, can, and do, oppose successful resistance to such semi-tyrannical measures. Nevertheless the policy of the Unions, however quiescent for the time, is still the same wherever, and whenever, the screw can be applied. An incident may serve to illustrate this.

An engine had suffered some slight damage to foot-plating by collision, a not infrequent occurrence where much shunting is done. This involved the cutting out and replacing of a small portion, which in all such cases had previously been done by fitters, the boiler makers doing the rivetting. Owing to scarcity of engines the work was urgent. The job was on the way, when I was informed that the boiler makers objected to the fitters doing the work as formerly, and that the consequences might be serious if persisted in.

I simply referred to the fact that such work had always been done in that way, and that their portion was the rivetting up. About two days after this, I received a letter from the Secretary of the Boiler Makers' Union asking for a meeting for the purpose of arranging what should be boiler makers' and fitters' work in the future.

I decided to hear what his proposals were. On his arrival, and after satisfying myself as to his " bona fides," we entered into the *pros* and *cons* of the affair, my foreman boiler maker being present (who himself was a member of the Union). The conclusion was that such work was generally done by fitters, but in some works the boiler makers did it. However, I claimed my rights to do as formerly, and that too without interference. To this he demurred, and said that the work at least would be done better by boiler makers, they being more competent.

Digitized by Google

I was amused with the naivete of his rejoinder, and enquired whether such competency was general with members of the Union! "Yes," he replied. I then informed him that I sent one of his members to do a job at one of the outside stations, by no means of a difficult character, and after spending nearly double the time usually required, he almost ruined the boiler through bad workmanship. Another man had to be sent to make it right. He shook his head incredulously. I then instanced another member of the Union who had been intrusted with repairs to an hotel boiler, who after a most wretched attempt to carry out the instructions given, had fairly run away. Again I gave names and dates, both of which circumstances were corroborated by my foreman.

I further mentioned the case of another of their members, who in attempting the renewal of a firebox front, had put the firehole in the wrong place. This was again corroborated by the foreman, himself a member of the Union. This overwhelming testimony, supported as it was by one of their oldest and most respected members, proved, I hope, a well merited lesson, and a rebuke to such unqualified assertions. The men instanced had all stipulated for, and had been paid at, the Union rate.

Thus, you are expected to accept unequivocally the *exequatur* of the Unions, a one sided affair, without being allowed to exercise your own judgment as to fitness. This policy, emanating from men, who too often prate, and plead, for reason and justice, necessarily reacts on the Society prejudicially.

I will venture on an assertion which may appear somewhat unreasonable, but which is at least based on actual knowledge and experience—that there are thousands of Trades Unionists, particularly on railways, who were unduly influenced when young by the plausible arguments and sophistries so deftly plied, to join the Society, but who would gladly leave it to-morrow were it not for the fact that each one of the many years' payment into the funds forges a link nearer to the period of superannuation, which at 60 years, if unable to continue work, entitles them to ten shillings weekly.

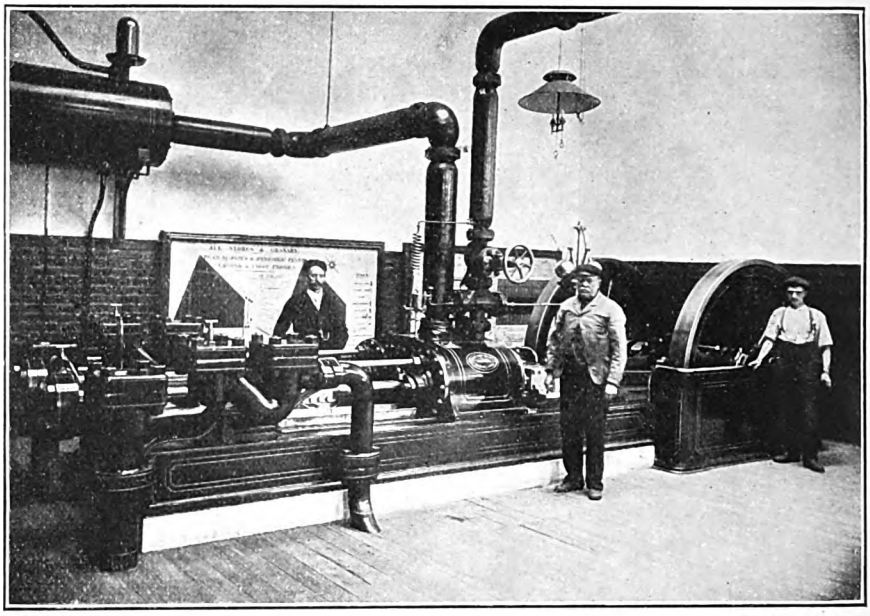
Such men view with futile disapproval and apprehension the injudicious policy of their leaders. Many in their time have seen the semi-flourishing condition of the funds to which they, by subscriptions and oppressive levies, have contributed, dwindle almost to the point of insolvency. Their interest in the Society grows, but not sympathetically, by each year's contribution. The payment of levies is a heavy tax on the more industrious of the community, and presses most heavily on those who are its most reputable workmen. Happily, coercion, as practised in my younger days, is no longer possible, but individual freedom of action is denied, in some instances reasonably, but in others, with no regard to either men or masters.

For example, youths just out of their time, often with very limited ability and experience, are instructed when applying for work, to demand the full standard rate of wages. This, I always let them know, when applying to me, would depend on their ability to do the standard work. In how many cases have I known them to reject the offer, even when their appearance showed unmistakeably their destitute condition after months of unemployment. Others, after soliciting a trial, when put to the test of very ordinary work, have failed by far to come up to the ability of some of our only partly graduated apprentices. How came it that they became members of a Union which boasts of good and skilled workmen only?

Railway Companies, more than any other corporate bodies, possess the peculiarity of inspiring their official staff with a certain pride of place or *esprit de corps*. The degree to which this is carried is largely due to successful administration, and its popularity with the public. There is no main trunk railway, but which at some critical period of its history has been benefited by some powerful administrator, who has either piloted it over some crises, or been the initiator of a new era of prosperity. In this respect no English railway has been more fortunate than the Midland. The "Haroun Alraschid" period or fortunate time from which its prosperity dates, will for ever be associated with the name of Mr. J. Shipley Ellis, for many years its Chairman, under whose masterly guidance and foresight, it developed to an extent never contemplated by its most sanguine founders. Mr. Ellis understood its geographical and commercial possibilities, and with unshaken resolution and courage, forced a policy of extension against the most severe opposition, which eventually carried the now famous insignia of the winged dragon or pterodactyl not only to the Metropolis, but to the British Channel, and the North and Irish Seas.

Under his splendid administration, Scotland was linked up by what is known and

Digitized by Google



Photo] [*C. Goldsmith.*

PUMPING PLANT FOR HYDRAULIC INSTALLATION AT ST. PANCRAS STATION.

On the further wall of the engine-room will be seen a large framed plan showing the arrangement of pipes and details of the hydraulic equipment. This system was instituted by the writer about 18 years ago. The plan records the position and utility of all underground pressure and ordinary mains, together with the supply and exhaust pipes and their controlling stop valves. Previous to that no plans or records were kept, and when the bursting of a pipe occurred it too often entailed the stoppage of the entire installation until made good. Every series of cranes, hoists, or capstans is now fitted with stop valves conveniently placed in order to cut out the defective place without stoppage. The diagram afforded a key which the most inexperienced could understand. The results were so satisfactory that the plan was adopted and made general through the whole system of the Midland Railway. The plans are carefully prepared to scale and painted on planished steel plates so as not to suffer from weather, and one is placed for ready reference on every engine house. The St. Pancras Hotel was dealt with similarly, as also the Kentish Town establishment, together with Whitecross Street goods station and other depôts on the Midland Railway.

justly considered as a masterly piece of engineering. He inaugurated a policy of "improve and advance" that has been more or less continued ever since. Not only was he a profound strategist, but he also possessed the ability of recognising and securing the services of some of the most able men, Sir James Allport in particular. He realised the importance of breaking away from the traditional hampering policy which had fettered the travelling public hitherto, and the third class passenger could book by every train. He further recognised the need for greater convenience and comfort, and his initiative in this respect forced every other competing line to follow suit. Hence the splendidly appointed and self-contained dining and sleeping cars which are so general a feature on the principal railways. No wonder that so successful a policy inspired the staff, not only with pride of place, but also with an emulative desire to excel in efficiency and discipline. He believed in the maxim so little inculcated, "That whatever you do, do well," and one of the most telling tributes to that policy so happily continued by his successors was from the chief Engineer of the Northern Pacific Railroad, U.S.A., who after travelling over the Midland system remarked to the writer, "I find nothing on this railroad either in buildings, equipment, or permanent way, but what would have done credit to the ancient Romans for solidity and permanency."

Nor does this stand alone, for Mr. Manvil, President of the Atchison, Topeka & Santa Fè Railroad, the head of the Commission appointed by the City of Chicago, and the joint railroads centralising there, accompanied by his engineer, and further assisted by Mr. George Reynolds, one of the most noted men in the States, to invest and report

Digitized by Google

upon the latest and best methods of dealing with traffic at goods yards and city depôts, in the year 1893, after visiting under my guidance the various depôts and timing the making up of trains by hydraulic, and other machinery, was so impressed with the smartness and despatch, that he avowed to the rest of the commission that they were "twenty years behind us." "Yes, Sir! I grant that," was the reply of one of his engineers, "but you must not forget that we build as many miles of railroads in the States in one year as would cover the ground of the principal railroads of England, and we have not yet had time to finish our work."

Yet another testimony, the Belgian State railways previous to changing their system of depôts in Brussels, etc., appointed a commission headed by M. Auguste Degraux, chief engineer of railways and consulting engineer to the port of Antwerp, to visit those of America, France, Germany and England, and report thereon. That gentleman after the most painstaking examination of buildings, machinery, locomotives, and particularly, the convenience provided for the men when lodging out, said that "on behalf of himself and staff, he wished us to know, that they had visited the principal railways in the United States of America also those of France, Germany, and Austria Hungary, but for order, cleanliness, and general efficiency they had seen nothing to equal it."

The cynical reader is at liberty to put his own interpretation on this, but I am merely giving, in less laudatory terms, the spirit of his remarks to the late Mr. J. Blazborough, Goods Agent, Mr. John Elliott, late Superintendent of the Line, and myself. If he adjudges me of "letting off steam" or "playing to the house" I can assure him I never believed in wasting steam, and have a supreme contempt for the man who "whistles for the wind." I simply seek to illustrate the benefit of that personal factor, "*esprit de corps*" so necessary to the success of every railway company and so strongly to the fore on the Midland Railway.

I had the rare opportunity and experience in the years 1873–4, when delivering Belpaire Engines built by Kitson & Co. for the German Government on the Alsace and Lorraine railways at Metz, to see some of the advantages of that system in actual service, and although far from being perfect I was much impressed with the comparative freedom from priming and the facilities offered for cleaning and examination of firebox, crown and stays, together with unchecked steam generation. The system suggested huge possibilities, though marred in that case by small diameter of barrel. On my return to England after taking service on the Midland Railway, I not only strongly recommended the system to Mr. Johnson, but also by means of a letter published in *The Engineer*, advocated its use. For years I persistently strove to persuade my engineering acquaintances to use the Belpaire form of firebox with as large a diameter of barrel as possible, pointing out the advantage of having as large a body of water under convection as possible, with additional steam and tube space, and the tubes never to be less than 2 in. diameter; but custom was too strong. However at that time Mr. Patrick Stirling was introducing the use of 8 ft. single driving wheel express engines on the Great Northern Railway, and by means of long stroke, and slow-running motion, he demonstrated that with about 900 square feet of heating surface he could do good work. The general outlines of this type were singularly tasteful and æsthetic. This along with Mr. Stroudley's previous efforts somewhat in the same direction, caused Mr. Johnson and Mr. Dean (Great Western Railway) to follow suit with the magnificent specimens of single driving wheelers yet to be seen on the Midland and a few of which are still to be found on the Great Western Railway.

Largely due to the initiative of Mr. Stroudley and Mr. P. Stirling, locomotive designers sought to combine the severely simple with utility, hence the cult of the æsthetic so markedly in evidence at that period. The success attending the very moderate heating surface of Mr. Stirling's engine, along with the unreasonable fear then entertained of lifting the centre of gravity beyond 7 feet, which any sensible increase of diameter of boiler would involve (with inside cylinders particularly), and further influenced by the praiseworthy or at least pardonable desire to combine comeliness with utility, all former considerations were too much opposed to the introduction of huge, uncouth top-heavy looking boilers. Still, whenever possible, I persisted in pressing the adoption of larger boilers with the Belpaire firebox, and at length saw its adoption by Mr. H. Pollitt on the Great Central Railway. Long after, I had the belated satisfaction of being informed that Belpaire boilered engines were to be built at Derby, and being invited to see the first boiler during construction, suggested still larger diameter of barrel, and further

Digitized by Google

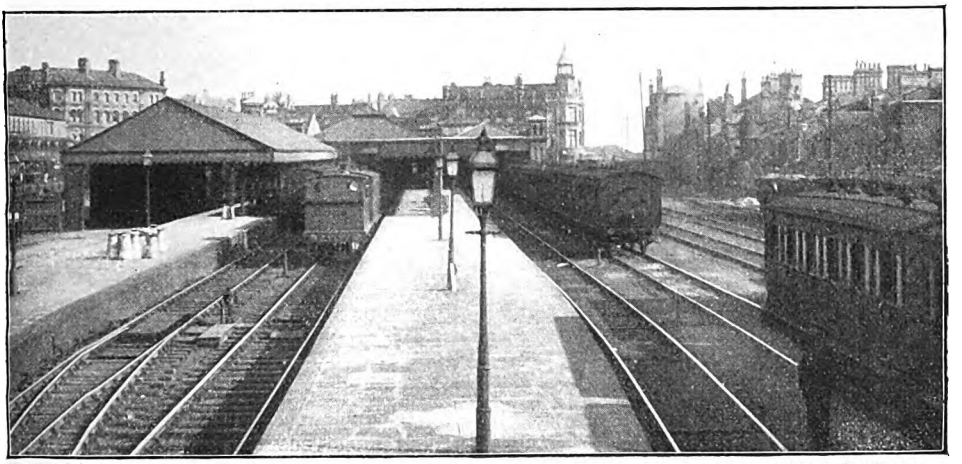
remarked that the Midland Railway would have been the first to use them had my advice been taken in 1875. The rejoinder was not without reason : " Yes, I remember, Weatherburn, but I like to be sure and on the safe side before taking so important a step." *Festine lente* is a safe proverb, but somewhat out of date ; tardy justice is better than none but before dropping this subject I would like to pay a tribute to Mr. McConnell who, when the head of the Southern division of the London and North Western Railway, designed the celebrated " Bloomer " type of locomotive with what were considered by many unnecessarily large boilers. During my apprenticeship with Messrs. Kitson, Thompson & Hewitson, I assisted in building engines of the "Bloomer" type to the order of the said Company, and well remember their abnormal appearance. Many years after I heard officials and drivers of the London and North Western Railway, whose experience was large and varied, declare that no engines, either before or afterwards, steamed so freely, and gave such satisfaction. The reputation of the " Bloomer " still exists as a tradition among the veterans of that company. Mr. McConnell in this and several other noteworthy features antedated and anticipated American and English practice by fifty years.

In concluding this imperfect account, I feel a sense of dissatisfaction, and regret at not being able to describe many of those who in their time constituted the main figures in the changing mosaic of railway life and architecture, whose worth, if not entirely forgotten, is now rarely thought of, while the recollection of others becomes familiar year by year. All great enduring concerns (particularly railways) have their large army of recurrent builders, who come to their alloted task, and after a time in turn make way for others, perforce content, possibly proud, to think that they have added something to the structure, but too often forgetful of the foundation, corner stone, and buttress work done by those who long since preceded them.

In my humble way, as " an old dog sleeping in the sun," I shall be pleased if in these brief experiences I have been able to revive even a short-lived interest in the men who so thoroughly pegged out the lines of a far reaching policy, as well as selecting the quarries from which the building material could be obtained as a perpetual legacy to their administrators and executors.

These articles commenced in the October, 1912, *Railway Magazine, and have recieved a great deal of attention in many quarters. In view of the large volume of correspondence resulting therefrom, arrangements have been made for Mr. Weatherburn to deal with various topics which have been raised in further contributions.*—[*Ed. R.M.*].

Digitized by Google



Photo] [*W. R. Robinson.*

CENTRAL STATION, LOWESTOFT.

The Great Eastern Railway and Lowestoft.

By F. C. WARREN.

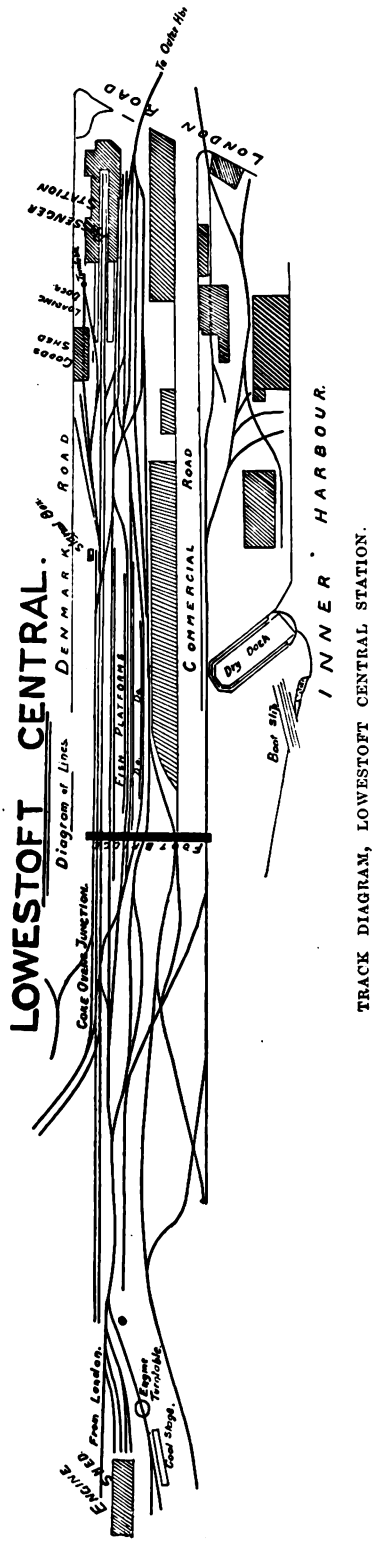
THE history of Lowestoft as a popular resort commences with the setting in of the "railway era." It is, therefore, in point of fact, almost as much a railway-made town as others more generally recognised, such as Crewe and Swindon. The first stage was the construction of the harbour, to form which the late Sir William Cubitt cut through the large bank of shingle and sand which separated Lake Lothing from the sea, in pursuance of a scheme for making a navigable waterway to the River Waveney and thence to Norwich. Particulars are not available as to the success of this undertaking, but, like many other waterways in those days, it afterwards passed into railway keeping, being acquired by the Lowestoft and Beccles Railway, which was incorporated by an Act of 1856 and which in 1868 merged in the East Suffolk Railway, now a part of the Great Eastern Railway system. In that interval much has happened; the harbour has grown considerably and the town has enlarged into a Borough with a sea-face approaching four miles in length.

The principal railway access to Lowestoft is a branch line from Beccles, crossing low-lying marshy ground. There is one intermediate station—Carlton Colville—where a spur line trends off to the Kirkley goods and coal yard at the south end of the borough, and to the sidings on the southern bank of the Inner Harbour.

Crossing the water where Oulton Broad adjoins the Inner Harbour, the line proceeds thence nearly two miles to the Central Station—the terminus—which is situated midway between the northern and southern extremities of the town. Approaching the "land of the rising sun" (a local designation sometimes given to Lowestoft, as the most easterly town in the British Isles), and travelling past the upper lengths of the Inner Harbour, on the right the view soon includes various buildings and ship-building yards where the trawlers that give Lowestoft its distinctive note may be seen in all stages of construction, here merely a matter of ribwork and there nearly ready for sliding off the stays into the water. Then, still looking to the left, the engine shed appears, a building some 200 ft. by 55 ft. containing four lines of track, with its attendant equipment of coaling stages and turntable. Immediately after this, served by loop lines, are four narrow fish platforms, averaging something like 700 ft. in length.

On the left, the stables and the goods shed—120 ft. long by 50 ft. wide—may be noticed, with loading dock beyond. In the passenger station each platform has a length of 550 ft., that on the up side having also a bay line beyond it. The station buildings are mainly on the down side and in front, and the main roof has a length of

Digitized by Google



TRACK DIAGRAM, LOWESTOFT CENTRAL STATION.

205 ft. and a width of 60 ft., with verandah extensions over each of the two platforms for a further distance of 200 ft.

Outside the station the track lay-out includes reception and storage sidings, fish traffic lines, goods shed and engine shed lines, and sidings serving the quay front of the Inner Harbour. Few places so restricted in width as that between Commercial Road and Denmark Road contain so many lines and connections—space is clearly valuable here. Several lines pass behind the passenger station and converge in a line crossing the London Road to serve the fish markets and warehouses around the basins on the northern side of the Outer Harbour.

Although frequently crowded in the summer season, the station in the main fulfils the requirements of the place and accommodates without undue difficulty the passengers of the 29 London and 27 Yarmouth trains which enter and leave it daily, as well as a number of local trains to Ipswich and other places. Nor is there special difficulty with the heavy and necessarily varying excursion traffic.

At the western end of the station is the Coke Ovens Junction of the Great Eastern and Midland and Great Northern Joint line passing northwards to Yarmouth, with a station of modern construction, Lowestoft North, conveniently serving the northern parts of the borough.

The harbour consists of two parts, the Inner Harbour and the Outer, both tidal. The Inner Harbour, the original Lake Lothing, extends from Oulton Broad for some two miles; in appearance a river with quays, warehouses, etc., on both banks. Where the beach was cut through there is of course an artificial channel bounded on both sides by masonry walls and over the middle of this "cut" revolves the swing-bridge carrying London Road, including the tramway tracks and the overhead electrical equipment, which of course has to be temporarily broken when the bridge is swung and consequently necessitated the ingenious method of severing and regaining electrical contact by the bridge dropping slightly to make the turn and rising again when restored to position for road traffic. Powerful machinery is provided for operating the bridge.

Passing through the cut, if sailing down the harbour, the private yacht basin is seen to the right bounded by the South Pier, a

Digitized by Google

long promenade with ample seat accommodation, a pavilion, restaurant and bandstand, its popularity being attested throughout the summer and holiday season by dense throngs of visitors. To the left of the "cut" is the Trawl Basin, and beyond that the Waveney and Hamilton Docks. Along the northern bank of the Trawl Basin is the Trawl Fish Market, a covered area of 29,000 sq. ft., where business waxes "fast and furious" as the trawlers bring their catches ashore. Beside the other basins are the herring and mackerel markets, with an area of 87,000 sq. ft., the former the rendezvous of the Scotch lassies who come down to Lowestoft to carry on the industry of curing the fish in the herring season.

The whole harbour, including a dry dock 240 ft. by 47 ft. in the northern bank of the Inner Basin, and a slip capable of containing vessels up to 200 tons adjoining it, is the exclusive property of the Great Eastern Railway. The company, moreover, has provided three steam tugs, the *Lowestoft* (172 tons), the *Dispatch* (130 tons) and the *Imperial* (64 tons) for the purpose of moving vessels in the harbour and bringing them in from or taking them out to sea. Besides these, a bucket dredger and a suction dredger are provided and continuously engaged in maintaining the requisite depth of water, a considerable tendency to accumulation of shingle having to be fought without cessation.

The Lowestoft fishing fleet consists of 600 vessels and the tonnage of fish brought to quay amounts to some 60,000 tons in the year, the value of this produce of the deep being put at roughly £720,000.

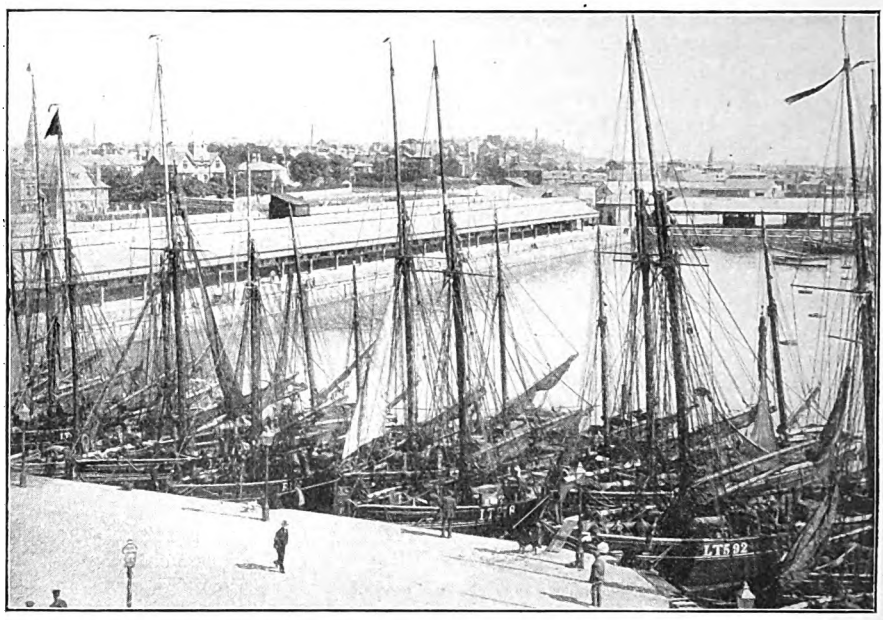
General shipping is conducted in the Inner Basin, coal and timber forming the principal items of import, and grain, bricks, flour and herrings the exports.

A peculiar advantage of the place is the accessibility of all these shipping operations, from the trawlers slipping gracefully into and out of the Trawl Basin to the larger and more stately ships brought into the Inner Harbour under tow by the tugs, with the bridge swung clear.

It has been calculated that the number of visitors arriving in Lowestoft runs well into six figures. The preponderance of holiday makers may be appreciated from the usually crowded streets of the summer season. Clearly, therefore, there is ample attraction in the place. In what does it consist? There are the invigorating breezes that come sweeping over the North Sea, and the vast expanse of fine yellow sand. And there is some special characteristic of the place in singular fitness with the large range of clear sky or high-piled cloud that keep the whole colour scheme in a tone of breezy, freshening brightness. There are the countless stories of recovered bodily health and recreation of mind. There are the endless changes arising from the movement of the ships and trawlers, and the night views over the sea from the higher vantage points. There are, too, the Broads

LOADING AND STORAGE ACCOMMODATION AT LOWESTOFT.

Digitized by Google



WAVENEY DOCK, LOWESTOFT HARBOUR.

and the fair country behind, the relative flatness of which is compensated by the width of vision, unconfined by hills as in other places. Finally, the various features which combine in the "make-up" of the place, have yet to be described.

Starting at the north end and travelling south, one stands on a heathy common, with the wide strip of grass-grown sand, known as the "Denes," and the long beach and sparkling sheet of sea beyond. A pleasant place for picnics, this heathy ground. The North Parade stands at an elevation of something like 100 ft., with the same enviable view open to the group of fine residences abutting this excellent public terrace which stands on the cliff, with the Model Yacht Pond at its foot.

The roadway down to the Denes and beach skirts the southern end of the Parade and beyond it is the Belle Vue Park and the Sparrows' Nest, both excellent examples of how public grounds should be laid out, the latter containing accommodation for outdoor concerts and a well laid bowling green, as well as the old thatched residence from which it obtains its name. The North Lighthouse adjoining is well situated and worth visiting.

From the Lighthouse, the London Road descends to the business quarter, where shops of all descriptions, from large stores to small confectioners, offer their wares to all classes of persons. The "Low Light" is out past the Denes behind the eastern part of this spot. Southward, crossing the harbour by the swing bridge, the London Road continues amidst large hotels and fashionable boarding houses, while landwards are numberless private houses where boarders are accommodated. Directly above the beach and parallel with the London Road from which it is separated by the large buildings of the "Front" runs the Esplanade, a scene of kaliedoscope movement in summer weather. At its most southerly boundary the Borough ends in Pakefield, notable for its old church and the rapid inroads which the sea is making, the sites of several houses having been swallowed up there and absorbed into the foreshore in the last 20 years. The coastline generally on this most easterly littoral is in fact being eaten away tide by tide at a very rapid rate, this process being checked, however, within the Borough of Lowestoft by the provision of groynes on an able scheme which has proved exceptionally efficient.

From the passenger and tourist point of view the Great Eastern Railway offers very favourable facilities. From London—(Liverpool Street or St. Pancras), Friday to Tuesday tickets cost 22s. 1st class and 11s. 3rd class, the rates for "Fortnightly Tickets" being 27s. 6d. 1st class and 15s.

Digitized by Google

3rd class; Tourist tickets, 33s. 1st class and 19s. 9d. 3rd class; and extra journey tickets to London 19s. 10d. 1st class and 11s. 10d. 3rd class.

Seaside periodical tickets are also issued, available for one, two or three months or longer periods, at very reasonable rates. Friday to Tuesday tickets, issued every Friday or Saturday by any train, are available for return by any advertised train on the day of issue or any day up to and including the Tuesday following, including Sundays where the train service affords means for the journey. Fortnightly tickets, issued by any train on any day, are available for return by any advertised train on any day within 15 days, including the days of issue and return. Tourist tickets, issued by any train on any day, are available for return by any advertised train on any day within six calendar months of the date of issue, from any station on the direct route within the limits to which they apply. Holders of Friday to Tuesday and fortnightly tickets wishing to extend their stay are enabled to do so, by their paying the difference between the fare paid and the next highest return ticket fare for the same journey; application for extension to be made at the station at which the return half of the ticket is available, not later than the date of expiry of its availability.

Holders of tourist, fortnightly and Friday to Tuesday tickets have the option of detraining at Beccles, Carlton Colville, Oulton Broad, Reedham, or St. Olaves, subject to their surrendering their tickets, as having completed the journey; and may commence the return journey from these stations, an alternative facility also applicable in respect of Yarmouth, Wroxham, Cromer, Mundesley-on-Sea, Gorleston-on-Sea, Overstrand, Trimingham, Sheringham and West Runton, although in these latter instances, the arrangement holds good for the return journey only. Equally, of course, similar alternatives for the return journey are open to holders of tickets to seaside places named, who may start the journey home at Lowestoft instead. These facilities naturally offer a good deal to those with dispositions of the more wandering sort, whose fancies may lead them round the coastline.

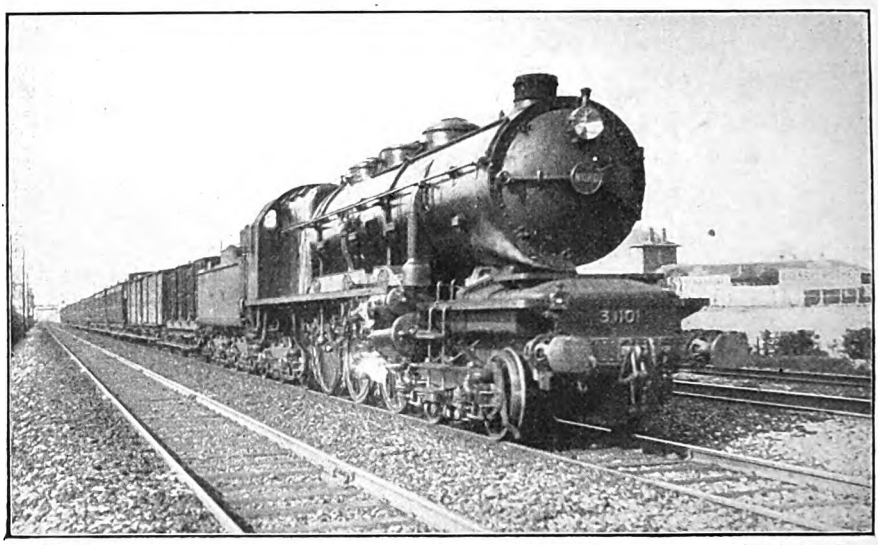
A further facility of similar character is that allowing tourist passengers to break the journey at Cambridge, Ely and Norwich, or at Colchester and Ipswich, according to the route taken. Needless to say, either place offers much of interest, according to the proclivities of the visitor who takes advantage of this privilege.

MR. C. J. EASTAUGH.
Stationmaster, Lowestoft Central.

Extra journey return tickets are issued, where announced, to the station at which the tourist or fortnightly tickets were issued and back, to a member of a family staying at the seaside, upon production of not less than two tourist or fortnightly tickets as the case may be. These cheap return tickets, issued to enable occasional journeys to the resident station and back during the stay of a family at the seaside, are available for eight days, including days of issue and return. If two members of the family desire to make the journey not less than four tourist or fortnightly tickets must be produced.

Mr. C. J. Eastaugh, stationmaster at Lowestoft Central station, is a veteran of the service. He joined the Great Eastern Railway in June, 1868, as a junior clerk at Dereham. The following year he was appointed booking clerk at Trowse, where he remained for three years, the latter part of the time as second goods clerk. On the opening of the Hackney Downs route to Enfield in 1872 he became booking clerk at London Fields, and booked the first tickets issued at that station. A year later he was appointed relieving stationmaster for the Norwich district, until selected, in 1875, to be stationmaster at Swaffham, where he remained for eight years. In August, 1884, Mr. Eastaugh was promoted to be stationmaster at Dereham, holding that position for 16 years, until in June, 1900, he was appointed to his present responsible position at Lowestoft Central.

Digitized by Google



Photo] [*H. Kelland.*

C. DE FER DU NORD.

No. 3.1101 (4–6–4 class) on 8.25 a.m. Boulogne boat-train near Pierrefitte.

Railways in France.

By W. PARKER.

RECENT events have brought to notice the excellent organisation of French railways in the time of war and the precise methods adopted were dealt with in a "Pertinent Paragraph" in the September RAILWAY MAGAZINE.

There are, however, many readers who desire more exhaustive information in regard to the normal management of the railways of our French friends, and such may be referred to Lord Monkswell's interesting and informative book on "French Railways," published at 3s. 6d., and to the report to the British Board of Trade by Messrs. Nicholas S. Reyntiens and Mervyn L. Chute.

A Government Blue Book is, of necessity, but very rarely an inspiring or even entertaining production, but from the mass of statistics, schedules, and tabulated statements so patiently compiled by Messrs. Reyntiens and Chute, much that is instructive and illuminating may be gleaned.

Before the advent of the locomotive, between the years 1823 and 1827, railway concessions were first granted in France with a view to providing improved communication between the centres of production and the waterways of the Loire and Rhone.

In 1833 concessions were granted for railways, the haulage to be performed by mechanical power. Three years later the question was debated in Parliament as to whether a system of concessionised or State railways would be preferable. In consequence, concessions for four private lines were refused in 1837, and also a proposal that these same lines should be State constructed, although powers for a few lines were granted to private undertakings, the most important being for the line from Paris to Orleans. The company constructing this line got into difficulties in 1839, and was unable to raise sufficient money to continue. This important line was, however, to be completed under a State guarantee of interest, and this system of guarantee won the confidence of investors, so that, at a later stage, it became the recognised foundation of railway operation.

In 1842 the French Government undertook to carry out an extensive policy of railway construction. The State was to make the earthworks and build the bridges, stations, viaducts, etc., while the companies to whom the concessions to operate the lines were granted had to lay the rails and to provide their own rolling stock, the agreement being that the railways should ultimately revert

Digitized by Google

to the State, the track and rolling stock being purchased at a valuation.

Between 1842 and 1852 a number of small independent railways were constructed, but during 1852 and in the following years the majority of these became incorporated into six big systems, forming in 1857 what are now the Northern, Eastern, Paris-Orleans, Paris-Lyons and Mediterranean, Southern, and the recently State-purchased Western. After 1857 public confidence was shaken owing to the large expenditure on branch lines, and the necessary capital for fresh lines was not forthcoming. The State thereupon stepped into the breach and in 1857 and 1859 laws were passed ratifying the conventions made with the six great companies.

With regard to the guarantee of interest the principles followed were :—

The lines of each company were divided into two classes, first the new lines, and secondly, the old lines. The State guaranteed interest at the rate of 4·65 per cent. on all capital expended on the construction of new lines, whereas the old lines did not enjoy this advantage. Net receipts of the old lines were to be employed thus :—In the first place, to secure the payment of interest and writing off of the debentures issued for their construction ; secondly, to complete the interest on debentures issued for the construction of the new lines, as the State guarantee would not be sufficient to enable the necessary interest to be paid ; thirdly, to pay a dividend to the shareholders which would not be inferior to those of preceding years ; and any surplus then remaining would be employed in decreasing the deficit on the new lines. When the net profits of both the old and the new lines exceeded the total amount of the guarantee of interest, and of what may be termed the reserved revenue of the old lines, such surplus would be handed over to the State for the repayment of any sums paid by way of guarantee of interest, which sums were only considered as loans bearing interest of 4 per cent. per annum.

In 1878 certain independent small lines belonging to various minor companies were amalgamated into the State system, these being mostly within a triangular district, the points of which were Chartes, Nantes and Bordeaux.

Owing to lack of funds, the French Government found itself in 1883 unable to continue the programme adopted in 1879, which embodied the building of new railways and the completion of partially constructed lines, at an estimated cost of $3\frac{1}{2}$ milliards of francs. To overcome the difficulty the State entered into agreements with the various companies which resulted in the conventions of 1883, under which the six big Companies are now working, with the exception of the recently purchased Western. All will terminate between the years 1950 and 1960.

French railways are divided into two classes :—(1) " Chemin de fer d'intérêt général " ; and (2) " Chemin de fer d'intérêt local." These terms are somewhat vague, and no convenient English equivalent can be given for them. The former consist of lines which are of value to the population of France as a whole, and generally traverse two or more departments ; they may consist of main lines, branch lines and even narrow gauge lines ; to this category belong the Northern, Eastern, Western (now the property of the State), Paris-Orleans, Southern, Paris-Lyons-Mediterranean, the " Grande " and " Petite Ceinture," and the original State Railway systems. The latter includes lines affecting the population of one department, borough or district only, or serving the territory of one department at the most. There being no better English equivalent, the French terms must be translated literally and the two classes termed respectively Railways of General and of Local Interest.

The " Grande Ceinture " belongs to the five big Companies in equal shares, the Southern Company (Midi) not being included as it does not run into Paris. The Board of Management is composed of three or four members from each Company. A similar arrangement exists in regard to the " Petite Ceinture," but a portion of this line belongs to the Western (State) Company, and the trains pay toll over this section. The passenger rolling stock is owned by the Ceinture itself ; at one time the hauling was done by the Western Company at a fixed charge, and on the " Grande Ceinture " by the Eastern.

Concessions for railways of general interest are granted by a convention between the Minister of Public Works and the Companies. This convention must be approved and declared to be of public interest before construction is commenced. Legislation was the same before 1852, when the first lines, which still remain in the hands of the large Companies, were established. Under the Second Empire, when these Companies were formed by the amalgamation of previous Companies, an Imperial Decree approved

Digitized by Google

the conventions in every case. At all times, a special law had to be passed for the purpose of sanctioning agreements binding the State to a financial contribution either by subsidies, guarantees of interest or annuities.

For lines of local interest concessions are granted either by the Mayor of the Borough or by the Prefect of the Department. A line, whatever may be its length, is declared to be of public interest by a law if it be termed a "Railway," that is to say, occupying its own ground; while in the case of a "tramway," that is to say, if it be laid along roads or streets for the greater part of its length, the declaration is made by a decree.

State subsidies are granted to lines of local interest, provided the subsidy is not contrary to a law passed June 11th, 1880, and that such subsidy does not infringe the terms of the annual financial law which authorises the Government to grant subsidies up to a certain figure.

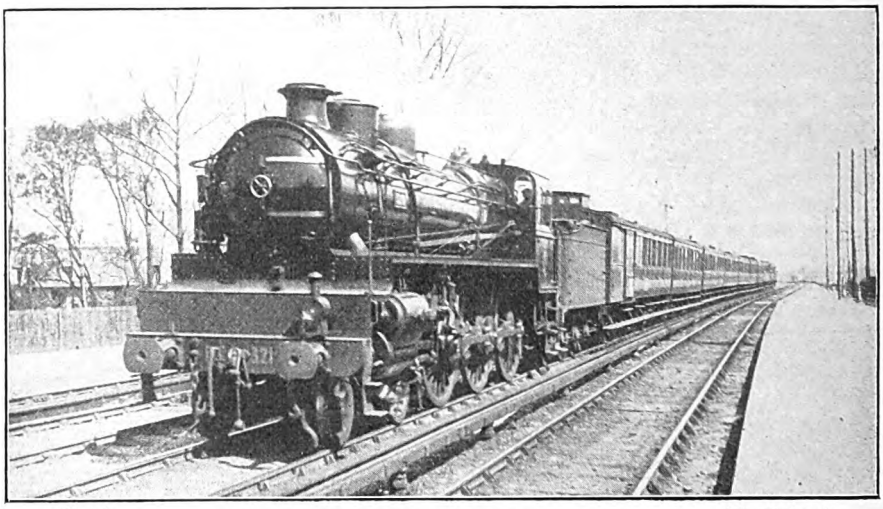
Concessions under which the Railways of General Interest are now operating will lapse as follows:—Northern, 1950; Eastern, 1954; Orleans, 1956; Paris-Lyons-Mediterranean, 1958; Southern (Midi), 1960; Ceinture de Paris, 1952; and Grande-Ceinture, 1958.

Conventions between the six big Companies and the Minister of Public Works were approved by laws or decrees in 1857 and 1859, and attached to each Convention was a "cahier des charges" or specification, which regulated the control of the state over the Companies. These Conventions were subsequently altered in 1883, but the "cahier des charges" was retained. These specifications are common to all the main railways whereas the Conventions differ on certain points.

From the "cahier des charges" many interesting items may be culled. Thus in regard to rolling stock, article 32 stipulates that the locomotives shall be constructed on the latest models and must consume their own smoke. Passenger coaches shall likewise be constructed on the latest models and shall be suspended on springs and furnished with seats. There shall be at least three classes. Coaches of the first class shall be covered, upholstered, and closed by means of windows; those of the second class shall be covered and closed by means of windows, and shall have cushion seats; those of the third class shall be covered, closed by means of windows, and shall be provided with wooden benches. The State administration may insist on at least one compartment in each class being reserved for ladies.

Under article 33 the Minister will decide, on the proposal of the Company, the maximum and minimum speeds for passenger and goods trains, also for special postal trains.

Stipulations concerning public services are numerous and far-reaching. Thus soldiers and sailors, whether travelling in parties or separately, on State business, on furlough, and on leaving the Army or Navy, are only



Photo] [*H. Kelland.*

PARIS—ORLEANS RAILWAY.

Rebuilt 4–6–0 locomotive working express train.

Digitized by Google

required to pay quarter fares; the same condition applies to their horses and luggage. Should the Government find it necessary to send troops, military or naval stores to one of the points served by the railway the Company shall immediately place at its disposal all its means of locomotion at half the rate fixed by the tariff.

Regulations applying to the postal service, as set forth in article 56, are very comprehensive; among them a clause enacts that "a special regular train, called 'daily postal train' shall be put each day at the disposal of the Ministry of Finance, free of charge, for the transportation of despatches on the whole of the line." The extent of the journey, the hours of departure or arrival, whether by day or night, the speed, and the halting places of the "daily postal train" are regulated by the Minister of Agriculture, Commerce, and Public Works, and the Minister of Finance, after consultation with the Company.

Another article states that the Company shall forward prison vans, the construction of which is paid for by the State, by any train which the administration may require. Warders and prisoners travelling in such vans shall only be required to pay half the price of the 3rd class. Gendarmes travelling with them shall only pay one quarter of the price of third class. The State Administration may, however, request the Company to provide one or more second-class compartments for the transportation of prisoners. For such compartments the price is fixed at 20 centimes per compartment per kilometre.

Extensive and elaborate supervision has to be exercised by the State to fulfil the conditions set forth in the "cahier des charges," and this control is in the hands of the Minister of Public Works who has departments of his office specially formed to deal with railway questions. To assist in deciding on technical and commercial questions, competent advisers are attached to the Ministry. The control extends over matters technical, commercial, financial, and includes the supervision of staff pensions, benevolent funds, etc.

Although no definite law or decree exists giving the Minister of Public Works control over agreements entered into between railway companies, he nevertheless practically exercises such control as in nearly every agreement the question of rates or finance is involved; but agreements covering the route to be followed by traffic or the pooling of profits are not numerous owing to each company having its own defined district.

Concessions for French railways of general interest are all temporary, and are granted for 99 years. On the expiry of the concession the State enters into the free possession of the railway line and its dependencies, and rolling stock, as has already been mentioned, is purchased by the State at a valuation. The Acts of Concession, and the "Cahier des Charges" attached to them, provide for the lapse of the concession in the case of the non-observance of the conditions.

There is another method whereby the State may enter into possession of the railways it has concessioned, before the expiry of the concession. Each Act of Concession states the period at the end of which the option of purchase may be exercised by the State. The rule usually followed in this case is for the net receipts of the last seven years to be taken; the net receipts for the two worst years are then deducted, and the result divided by five, so that the average for the best five years is arrived at. This sum will then represent the annuity which the State will have to pay the company for the remainder of its concession.

All railways in France are subject to ordinary taxation. Some of these taxes are very heavy by reason of the stamp duty imposed upon consignments on the railways. The only favours enjoyed by the railways are certain reductions on local taxes. Material employed for the construction of railways or stores for consumption on trains are exempted from the "Octroi" dues; in Paris, however, this only applies to material, so that combustibles, for instance, are subject to very heavy dues. Quite independent of taxation the railway companies have to grant the public services reduced rates and even free transportation in some cases, as may be seen by a perusal of the "Cahier des Charges."

Transportation of merchandise is effected by fast trains, or slow goods trains, the former being termed "Grand Vitesse," and the latter "Petite Vitesse." The general tariff for passengers and goods, both fast and slow, is common to all the big systems, and is calculated on the kilometric basis. The conditions of transportation and subsidiary charges for these general tariffs are also common.

All new rates which the railway companies desire to put into operation must be submitted to the Minister of Public Works for

Digitized by Google

approval. At times a merchant or big consignor will apply direct to the Minister to obtain a reduced rate, but the usual procedure is to apply first to the local Chamber of Commerce, which forwards the appeal to the railway company concerned. Should the railway authority fail to adopt a suitable rate, recourse is made to the Ministry of Public Works, still through the local Chamber of Commerce. In France, for the furtherance of local industries, special rates are very numerous, and export rates are in operation to enable French ports to compete with neighbouring ports in foreign countries, but import rates, although in use for a similar purpose, are not common.

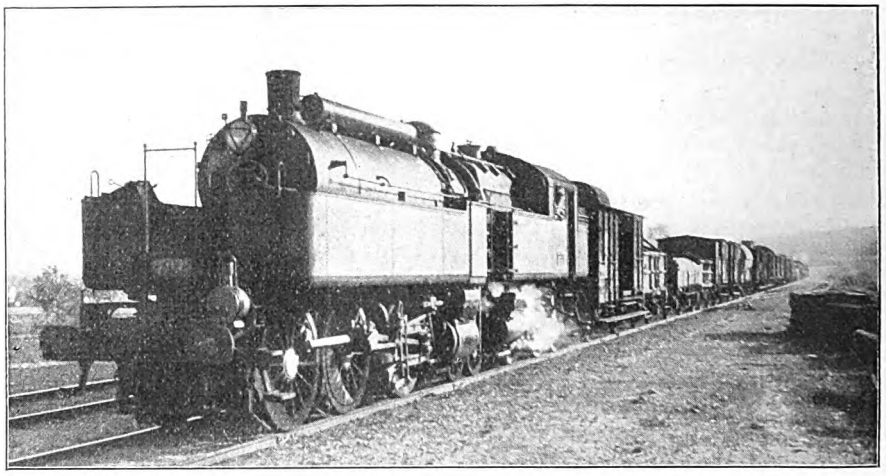
Passenger arrangements do not present many striking peculiarities. The general tariff "Grande Vitesse" is common to all the large railway systems. Children under three years of age do not pay fare so long as they sit on the knees of the persons in charge. Children between the ages of three and seven pay half-price. Two children may not occupy more than one seat in the same compartment.

Non-transferable permits are issued giving the right to obtain tickets at half-price between all stations of the Eastern, State, Southern, Northern, Orleans, Western, and Paris-Lyons-Mediterranean Railways. These permits can be obtained for either first, second or third-class for three, six or twelve months. They can likewise be obtained for one, three or for all the seven large systems and the "Grande Ceinture." The price of a permit of the latter character, first-class, is 320 francs for one year, while third-class for three months only figures out at 60 francs. When permits are issued to two or more partners of one firm for the same railway systems, a reduction of 20 per cent. is made on the second permit, and 30 per cent. for the third permit and for each of the others.

Season tickets for varying periods by all classes are issued on the principal systems, giving the right of travelling on certain determined lines of two or more at least of the leading railways.

Circular tickets are issued for distances of at least 300 kilometres on one or more of the principal railways. The itinerary must be indicated by the passenger with the mention of the stations at which he desires to alight. Collective circular tickets are included in the arrangement, but while the price for two persons is double the amount of the ordinary circular ticket, should there be a third person the figure is reduced by 10 per cent. for the third, and should there be others, 25 per cent. for each further person.

On the Northern Railway collective season tickets are issued to partners in business, a reduction of 50 per cent. on the ordinary season ticket being made. Individual season tickets are also issued to partners, one ticket only being issued, which may be used alternately by each holder. The



Photo] [*H. Kelland.*

CEINTURE RAILWAY.

0–6–2–2–6–0 articulated compound tank engine (Nord design) ascending a bank of 1 in 100 near Poissy with a heavy goods train.

Digitized by Google

prices are those of ordinary season tickets, with a reduction of 10 per cent. for two persons, 15 per cent. for three, 20 per cent. for four, and 25 per cent. for five or more.

Other special arrangements of the Northern Railway include family season tickets, 21 days' season tickets for watering-places, weekly third-class tickets for workmen and employés, excursion tickets for day trips to visit castles, ruins, forests, etc., special return and season tickets to seaside resorts, while tickets for emigrants to Algeria are issued at half third-class fare to Boulogne, Calais and Dunkirk.

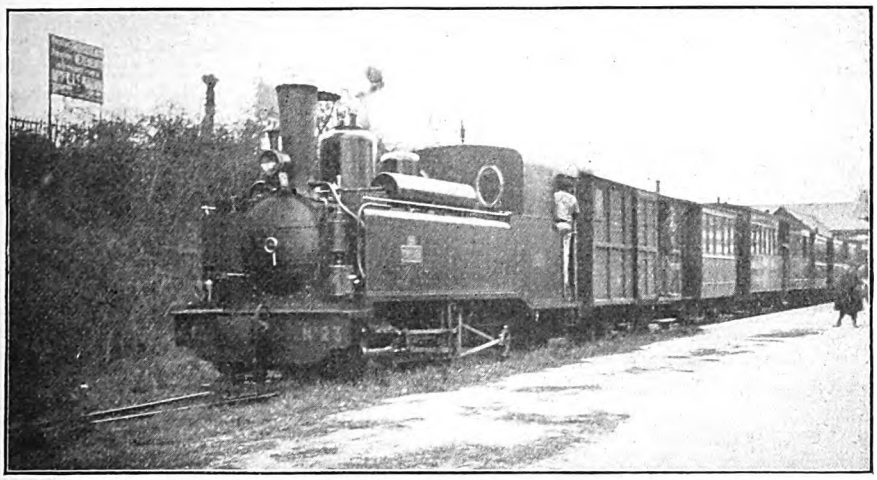
Although the general basis of goods rates in France is per tonne per kilometre, nevertheless certain rates exist giving one price per tonne for the whole distance, and in some cases the price may be the same while the distance varies.

The Railway Advisory Council appears to favour an increase in the number of private sidings with a view to easing the congestion existing in the stations. In colliery districts, for a similar reason, the companies have constructed private sidings at a reduced cost to proprietors.

Private goods wagons are not very extensively used on French railways, reservoir and refrigerator wagons being practically the only types employed. They are admitted to circulate on the various lines provided they have been inscribed on the register of one or other of the big companies, or a foreign railway administration. The plans of the wagons must be submitted for approval and the upkeep and maintenance must be undertaken by the owners.

Inter-company competition does not exist in France to any great extent owing to the agreements between the companies. Although these agreements are not "de jure" under the control of the State, "de facto" they are, as they must either involve questions of finance or traffic, both of which are directly subject to State control. A certain competition arises owing to the rule that consignments must go by the shortest available route from the point of departure to destination, and in order to obtain the traffic a company will sometimes construct a line, lessening its distance and so obtain the traffic from a company previously possessing a shorter route.

An instance of this was the traffic passing from Beziers to Paris. Primarily, the traffic, owing to the doctrine of the shortest route, passed from the Southern Railway to the Paris-Lyons-Mediterranean, and thence to Paris. The Orleans Company, however, constructed a line which, by reducing their distance, diverted the traffic to them. The Paris-Lyons-Mediterranean then threatened to build another and shorter line, so an agreement was come to to pool the traffic. Here the traffic does not actually pass over the shortest route, although paying for such, owing to the very steep gradients thereon.



Photo] [*M. G. S. Blane.*

FINISTERRE RAILWAY.

This is one of the metre gauge light railways in France. A mixed train is shown at Quimperté station. The engine is a 0–6–0 outside cylinder tank engine No. 23, *Pont l'Abbé*, built by Corpet & Louvet of Paris in 1906.

Digitized by Google

In fact, the transport is carried on in proportion of 75 per cent. by the Paris-Lyons-Mediterranean and 25 per cent. by the Orleans Company.

French merchants consigning goods by rail mark on the consignment note "Au tarif le plus reduit," thereby claiming the cheapest rate. As few of them know what the cheapest rate really is and considerable difficulty appears to be found in France in acquiring knowledge of the tariffs, there have arisen certain firms and private parties in all the big towns who make it their business to check all railway rates submitted to them by their clients. These firms either require their customers to become regular subscribers or to pay a substantial percentage on all overcharges recovered from the railways.

Traders in France appear to have two great complaints against their railway companies: First the length of time taken to transport goods by "Petite Vitesse" and secondly the shortage of goods wagons.

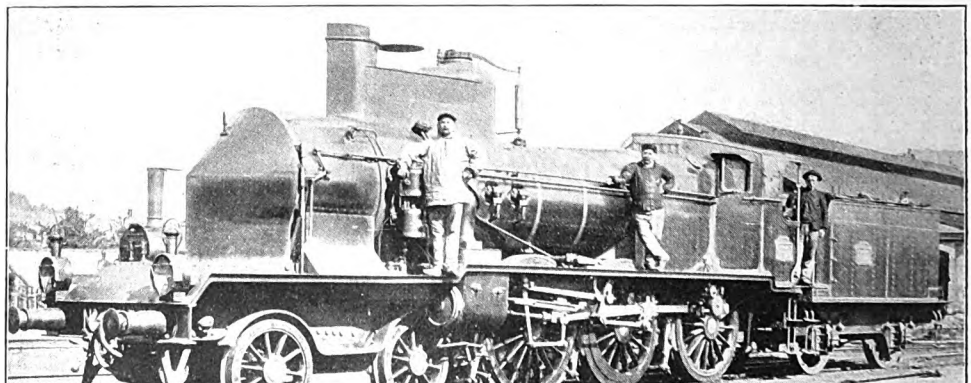
All French railway companies adopt female labour for suitable work. Women fulfil the duties of gatekeepers at crossings, and are also to be found in offices as typists, and in the stations as ticket clerks. On the State lines women are placed in charge of halts. Hours of work performed by railway employés concerned in the safety of the line are controlled by the Minister of Public Works.

As a general rule the companies do not supply their staffs with uniforms; they prefer that the employés should purchase their own, or the company may enter into arrangements with an outfitter to supply the staff at a reduced rate, or again the men may be furnished with uniforms, but a deduction made from their salaries.

Staff arrangements include Conciliation Boards and Pension Funds, and free passes and privilege tickets are granted to railway workers on all the French railway systems.

On the Northern Railway privilege tickets are granted to the wife, children, father and mother of each employé. On the Southern all members of the staff travel free of charge on the system of the Company. They are also entitled to a certain number of free journeys on other French systems, and an unlimited number of journeys at quarter fare. The families of employés have a right to a number of free journeys on all French railways, and an unlimited number of journeys at half price. Retired railway workers may also obtain a certain number of free journeys and privilege tickets on the Southern system. Very similar travel advantages are granted to the staff on the other French railways.

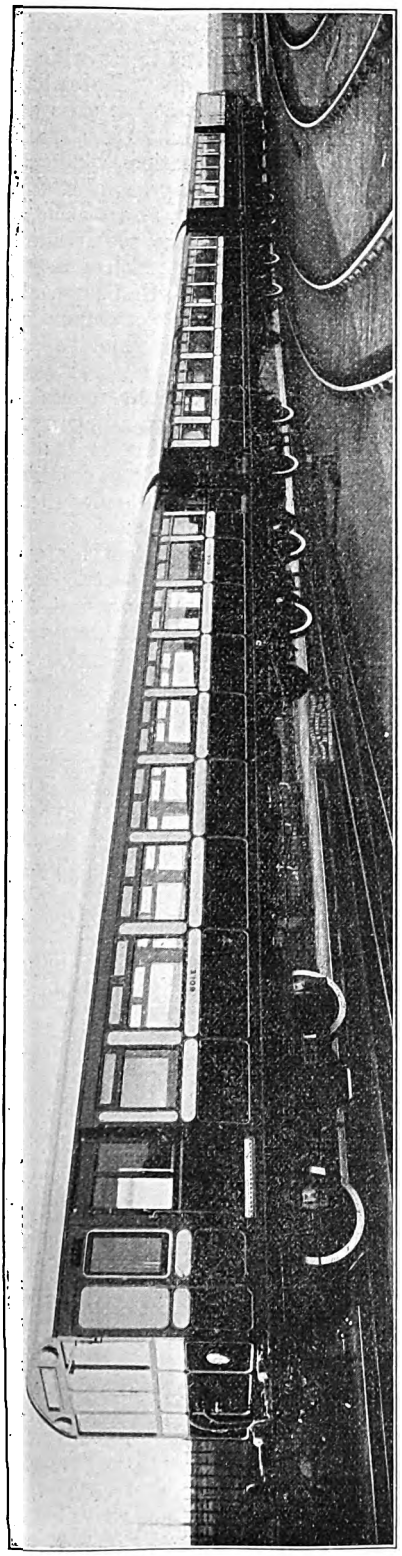
Salary scales and other staff arrangements are very elaborate and present a very formidable array of figures, and these, with schedules of goods rates, passenger fares and an amazing mass of valuable information on the French railway systems, may be found by the serious student of railway affairs in the blue-book mentioned at the beginning of this article.



Photo] [*H. Fayle.*

PARIS, LYONS AND MEDITERRANEAN RAILWAY: 4-6-0 COMPOUND LOCOMOTIVE.

Digitized by Google



THREE-COACH ELECTRIC TRAIN: LONDON AND NORTH WESTERN RAILWAY, EARL'S COURT-WILLESDEN JUNCTION SERVICE

Electric Rolling Stock: London and North Western Railway.

ELECTRIC traction on the London and North Western Railway was inaugurated on May 1st, for the Willesden Junction-Earl's Court service, but for the time being Metropolitan District rolling stock has been employed, the London and North Western Company's trains not being completed. The electrical equipment was described in the RAILWAY MAGAZINE for June, and a seating diagram of these trains was then given.

The new trains, of which four are at present concerned, have now been delivered from the works of the Metropolitan Railway Carriage, Wagon and Finance Company, Ltd., and by the courtesy of Mr. F. A. Cortez-Leigh, Electrical Engineer of the London and North Western Railway, we are able to reproduce a selection of photographs of the new stock.

Each train consists of three vehicles—motor car, trailer, and control-trailer. The coaches are provided with transverse and longitudinal seats, central passage-ways, vestibules and connections, and are completed in accordance with London and North Western standards as regards painting and lining out, upholstery and other features.

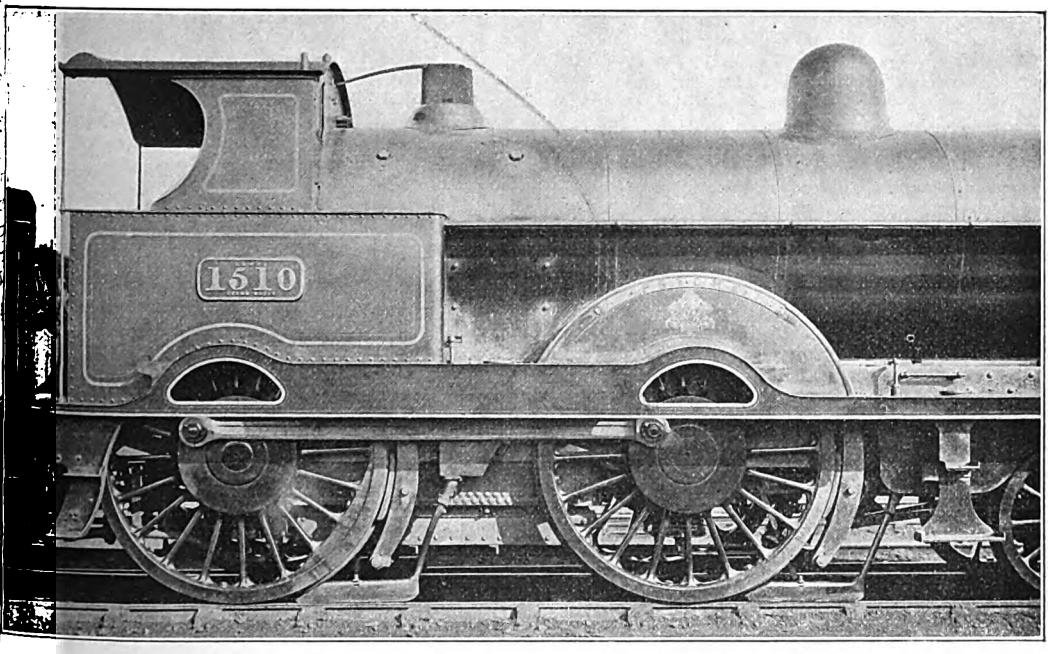
All the vehicles are 56 ft. 11 in. long over the headstocks, the motor cars being carried on two four-wheeled pressed steel bogies of 8 ft. 9 in. wheel base, with centres 37 ft. 6 in. apart, whilst the trailer and control-trailer vehicles are mounted on bogies having a wheel base of 9 ft., with centres 38 ft. apart. The wheels are 3 ft. $5\frac{5}{8}$ in. diameter in all cases. All vehicles are 9 ft. wide at the waist and 7 ft. $5\frac{3}{4}$ in. from floor to centre of roof inside. Outside, the highest point of the roof is 12 ft. above rail level. The underframes are of steel and are plated underneath the floor with $\frac{1}{8}$ in. steel plates. Fireproof "Uralite" packing pieces are fitted between the plating on the underframe and the wooden members of the coach body. The waist panels of the body consist of Lysaght steel plates, and all wood work on the roofs are fireproofed. In the case of the motor coaches

Digitized by Google

Digitized by Google

The control gear is duplicated as far as necessary in the driver's compartment of the control-trailer cars, the trains being operated on the multiple unit system. The whole of the contactors, circuit brakers, reversers, etc., for the motors are in a steel compartment between the driver's cab and the luggage compartment. For supplying the compressed air to the brake cylinders, two of the trains are fitted with electrically operated Westinghouse air compressors, while the other two have the Knorr Brake Co.'s electrically driven compressors with rotary slide valves. The main electrical equipment has been supplied by Messrs. Siemens Brothers Dynamo Works, Ltd. Good progress is being made with the main electrical system now being installed by the London and North Western Railway. Conductor rails have been laid over several miles of track, and the rolling stock which will be required is well in hand, the trailer cars being now under construction at the Wolverton Carriage Works of the Company, under the direction of Mr. H. D. Earl, Carriage Superintendent, and the motor cars at the works of the Metropolitan Carriage, Wagon and Finance Co., Ltd. Several of the trailer cars in process of construction are shown in a view of the carriage body shop at Wolverton, reproduced on another page.

SAND SHIELDS FITTED TO LONDON AND NORTH WESTERN RAILWAY LOCOMOTIVES.

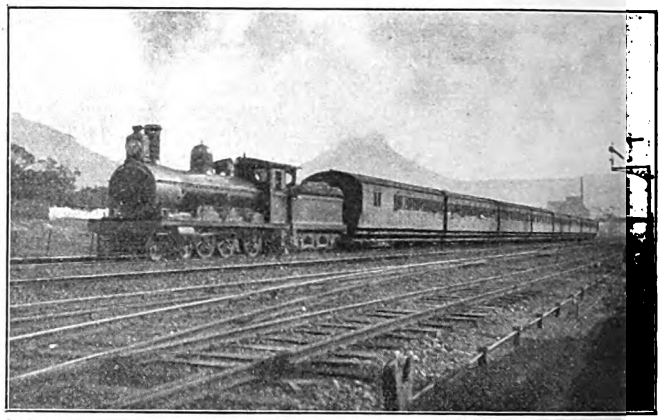


NO. 1510 *Psyche* (PRECURSOR CLASS), LONDON AND NORTH WESTERN RAILWAY, FITTED WITH NEW SAND SHIELD.

Several London and North Western locomotives have been fitted with a new sand shield, the joint patent of Messrs. C. J. Bowen Cooke and Nash. The application of these sand shields to a locomotive of the "Precursor" class is illustrated, by the courtesy of our London and North Western contemporary. These shields ensure the sand being delivered at the point of contact between the tread of the wheel and the rail, and are effective in preventing the sand being blown off the rails by a side wind, often a fruitful cause of loss of time and sticking. They can be fitted to all types of locomotives, and are adaptable to all systems of sanding apparatus. The shield consists of an inverted U-shaped metal fitting running a very small distance above the rails, and constituting virtually an enclosure wherein sand received from the sand pipe is distributed over the surface of the rail before each wheel.

Digitized by Google

Railway Travelling in South Africa.



Photo] [*M. Leendertz.*

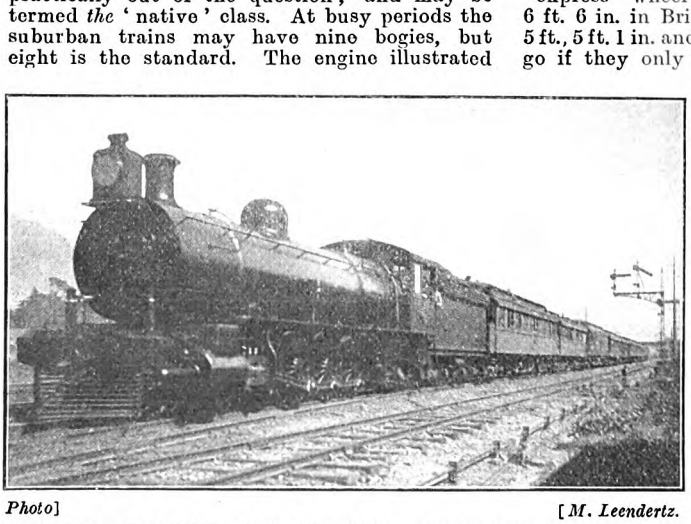
SUBURBAN TRAIN OF EIGHT BOGIE COMPARTMENT VEHICLES, NEAR CAPE TOWN.

4–6–0 locomotive No. 403

We are indebted to Mr. Martin Leendertz for a series of interesting photographs of South African trains, and his remarks in reference thereto may also be reproduced :—

"The first illustration shows a typical Cape suburban 'set' train consisting of eight bogie vehicles (compartment type)—two third class, one second, and five first, in the order named, the predominance of the highest class being due to the fact that nearly every one travels first in South Africa, this, indeed, almost corresponding to third class in Great Britain. Poorer whites and the more respectable coloured people mostly patronise the second class, while the ordinary natives and occasionally a few very poor white people travel third. On the long-distance journeys ordinary middle-class Europeans patronise the second class more, but the third class, owing to the odoriferous native passengers, is practically out of the question; and may be termed *the* 'native' class. At busy periods the suburban trains may have nine bogies, but eight is the standard. The engine illustrated is No. 403, one of the 4–6–0 (4 ft. 6 in. coupled wheels, class 6), a 'converted' main line engine, built in 1893 by Dübs & Co. A wind shield is fitted at the back of the cab, so that running backwards is no hindrance to the men. The speeds obtained are excellent, and beat many of the British steam suburban services. I was in England last year, and was disappointed with the steam suburban train speeds, on the whole. The acceleration was very poor, generally speaking.

"For long-distance traffic, of course, we are practically nowhere in South Africa as to speed, what with our 3 ft. 6 in. gauge and heavy grades of 1 in 30, 1 in 40, 1 in 66, etc. But for a short distance, where great acceleration counts, our locomotives, with their small wheels and large cylinders, are extremely fast. 4 ft. 6 in. may be said to be the standard 'express' wheel diameter in South Africa, like 6 ft. 6 in. in Britain, but we have engines with 5 ft., 5 ft. 1 in. and 5 ft. 2 in. wheels, and these *can* go if they only get a fair chance. The Cape Peninsula suburban service is carried on by the class 6 engines and later editions such as class 6A, 6C, 6D, etc., which have slightly larger boilers and different chimneys and minor differences, but are otherwise the same. There are also some 4–4–0 5 ft. wheeled engines, very fast when once on the go, but not so good at starting.



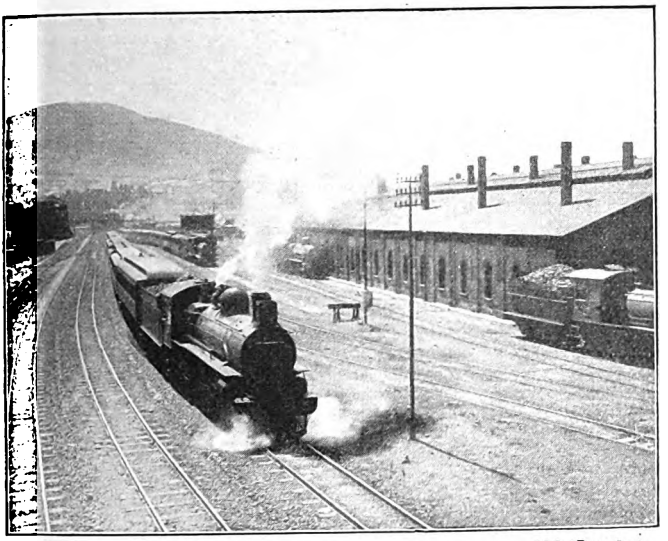
Photo] [*M. Leendertz.*

11.40 A.M. CAPE TOWN–JOHANNESBURG CORRIDOR DINING CAR MAIL TRAIN NEAR CAPE TOWN.

4–8–2 locomotive No. 1478.

"The second illustration, taken from practically the same point, known as Craigs' Crossing, about 1¾ miles from Cape Town, shows the 11.40 a.m. Cape Town-Johannesburg corridor dining car mail train. The engine, No. 1478, is of the 4–8–2 wide firebox type, weighing 82 tons without the tender. It has 4 ft. 6 in. wheels and 22 in. by 28 in. cylinders.

Digitized by Google



Photo] [*M. Leendertz.*

3 P.M. CAPE TOWN–JOHANNESBURG DINING CAR CORRIDOR TRAIN PASSING THE ENGINE SHEDS NEAR CAPE TOWN.

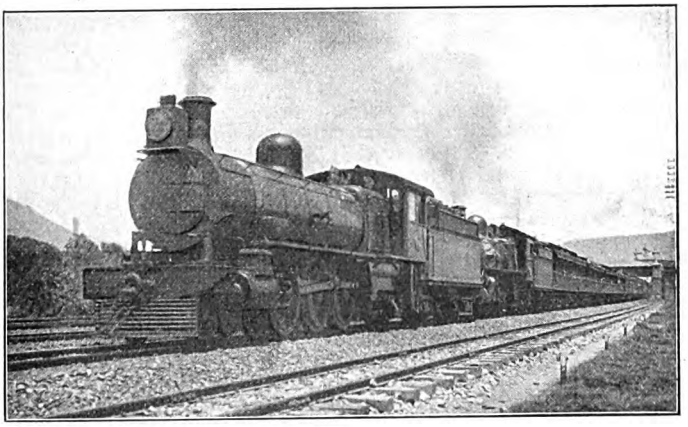
4–6–2 locomotive No. 771.

The train consists of nine corridor coaches, the middle one being a dining saloon, and the last coach a mail van. This type of engine can pull fifteen heavy coaches, some weighing over 77,000 lbs., and keep time, the heaviest grade on her section being 1 in 66, unassisted, although in the Hex River Pass a banking engine is used on the 1 in 40 grades. With the usual ten coaches she is merely 'playing' on the level, and she can take it easy on the present time table, 'thrashing' being quite unnecessary. Speeds up to 50 miles per hour can be attained by this type, but high-speed running is not encouraged; rather an even 30-35 when possible. There are at present only two of these monsters here. They were built in 1910 by the North British Locomotive Co., Ltd., and designed by Mr. Beatty, then locomotive superintendent of the Cape Government Railways, and who retired on the consummation of the Union.

"The other types which are now used for the heavy main line work are 4–6–2 5 ft. 1 in. wheeled Beatty 'Improved Karroo' type—splendid engines—and 4–6–2 10c class (4 ft. 9 in.) Transvaal type, which have Walschaert gear. Since the advent of the wide firebox an enormous improvement has resulted, because the ordinary firebox is far too cramped; and practically every one of the new South African engines is now constructed with a wide Belpaire firebox. No. 1478 has the combustion chamber carried forward into the boiler, which is somewhat of a novelty, and several more of her type are on order; but these will be fitted with piston valves, Schmidt superheaters and the Walschaert gear.

"The third view shows the 3 p.m. Johannesburg train a few minutes after leaving the Cape Town terminus. This train only runs during the holiday season, and is timed pretty smartly. The engine is of the 4–6–2 type, has 4 ft. 9 in. driving wheels, 20 in. by 28 in. cylinders, Belpaire wide firebox, and weighs 64 tons without tender. There are two pairs of Ramsbottom safety valves, and between them and the dome is the dynamo (turbine) for driving the electrical headlight. These engines are called the '10c' class here, and were built in 1910.

"The fourth view shows the 11.40 a.m. Cape Town-Johannesburg train, about 1½ miles from Cape Town, and about five minutes after its start. It is running about 30-35 miles per hour. The leading engine, No. 781, of the 4–6–2 type, class 5, has 5 ft. 1 in. wheels, 19 in. by 28 in. cylinders, and wide Belpaire firebox. It will be noticed that it is handsomer than the '10c' class, which has Walschaert gear. Class 5 is really a Cape design, while class '10c' is a Transvaal design, but used in the Cape since the Union. Class 5 is an improved 'Karroo' type, built for fast running (as we understand it here) on the plains, but has proved most speedy for heavy work locally; and personally, as a passenger, I prefer them to any others for really fine work. The other month I timed one



Photo] [*M. Leendertz.*

11.40 A.M. CAPE TOWN–JOHANNESBURG DINING CAR CORRIDOR TRAIN, ABOUT 1½ MILES FROM CAPE TOWN.

4–6–2 Locomotives Nos. 781 and 773.

Digitized by Google

of them, and she did a mile in 67 seconds—not bad for a 3 ft. 6 in. line! Two engines are unnecessary for the train in question, but it is usual at times to send out two engines and for one to return with another passenger or a goods train. The line in the foreground is for shunting only, and therefore is not so finely ballasted as the others. No. 781 weighs 71 tons without tender, and was built in 1912.

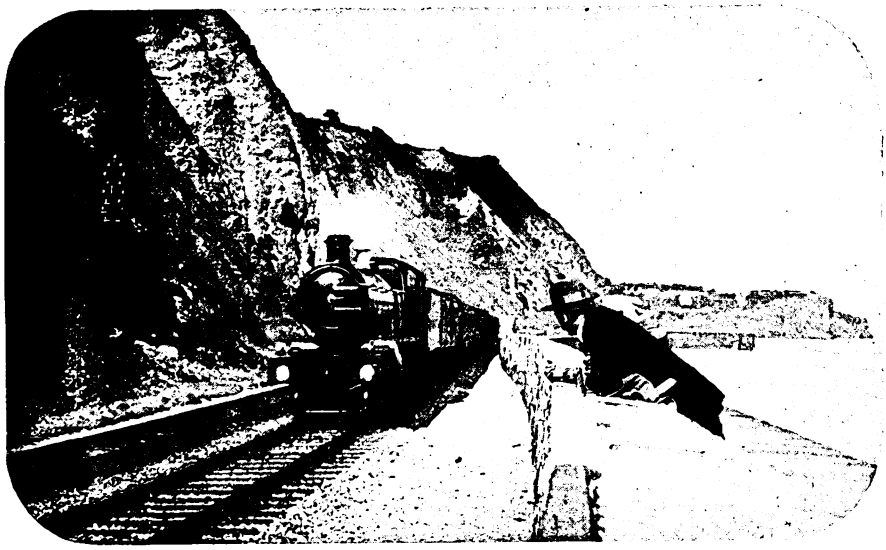
"A view is also sent (not reproduced) showing a Cape Peninsula suburban train. The engine is No. 056 (formerly 56), 4–4–0 type, wheels about 5 ft. These engines were built by Sharp, Stewart & Co. in 1903, and are splendid runners with a moderate load, such as a usual set of eight bogie compartment coaches. They are the nearest thing we have here to British express engines, but for the cowcatcher, central buffer, front lamp, and wind screen behind the cab (for running backwards). Tank engines are not now used on the line in question. These 4–4–0 engines were specially built for the Cape suburban line, the others in use being converted main-line engines, but for some reason or other, they have been put in the obsolete class, whence the O in front of the number. However, under a capable driver, they can give the 4–6–0 engines a good beating, after once reaching about 10 miles per hour. They are remarkably easy running, and one of the drivers of this class has a reputation for fast driving. Less competent drivers seem to have trouble in getting these engines to start well, but the fault must be with the man, for some drivers can get beautiful speeds with these engines. Running (start to stop) to Salt River (2½ miles) in 5¼ min. is nothing to them, with the standard load of 8 coaches, and I have even timed one to do it in 5¼ min., although there is an adverse gradient for half-a-mile. The other engines on the suburban line, which have 4 ft. 6 in. wheels (4–6–0 type), are generally better starters, although I have known O49, with nine coaches, to overhaul a 4–6–0 engine with eight and working at almost full power. These 4–4–0 engines are painted green; but all the others are grey or black, like the London and North Western locomotives, but for the lining—even lining has now been done away with here, except in the case of these 4–4–0 engines ('high-fliers' as the railwaymen term them)."

Railway Literature.

THE DEVELOPMENT OF BRITISH LOCOMOTIVE DESIGN. [By E. L. Ahrons, M.I.Mech.E., M.Inst.Loco.Eng.] A portion of this book was originally published as a series of articles appearing in the *Locomotive Magazine* under the title of "Some Historical Points in the Details of British Locomotive Design." These have, however, been thoroughly revised, and largely rewritten and amplified to accord with the wider scope now covered. In the result Mr. Ahrons has provided a splendid collection of information, with no fewer than 198 line or half-tone illustrations and several folded plates. Much of the information will be familiar, but on the complete basis now adopted the work can be cordially commended to all our readers. It is published by the Locomotive Publishing Co., Ltd., but copies can be had at the offices of the RAILWAY MAGAZINE, 30, Fetter Lane, London, E.C. The price is 5s., or 5s. 4d. post free in the United Kingdom.

"ROCK-CLIMBING IN CUMBERLAND" is the title of an interesting booklet issued in conjunction with the Furness Railway. It is described as "A notebook for novices," and introductory chapters deal with the schooling of a rock-climber, while following sections describe the principal districts selected. Concluding chapters are entitled the "Reflections of a Climber," and "Cumberland Snow-climbing." Many of the Furness Railway facilities, including a number of arrangements which apply all the year round, will appeal to the rock-climber, and all interested are recommended to apply to Mr. Aslett, at Barrow-in-Furness, for copies of this booklet, and of the tourist literature so liberally issued during the last few years under his auspices.

Digitized by Google



Photo] [*E. A. Gurney Smith.*

GREAT WESTERN RAILWAY.

Down express near Teignmouth. 4-6-0 locomotive, No. 2982.

Railway "Business as Usual."

FACILITIES SUITED TO THE NEEDS OF THE SITUATION.

AS indicated by references made last month, and also in "Pertinent Paragraphs" on other pages of this issue of the RAILWAY MAGAZINE, the most remarkable feature of the situation at the time of writing is the fact that railway passenger travel is so nearly normal as it is. Trains have been taken off, particularly some of the special summer expresses, and one cannot altogether overlook the fact that our country is engaged in the greatest war the world has ever known; but, speaking generally, there is every indication, except for the posting of royal proclamations, and Lord Kitchener's "Appeal to Arms" at the stations, that the railways are "Doing Business as Usual." Indeed, occasional special announcements to the effect that a particular section will be closed to ordinary traffic within such and such hours or on specified days, and the general disarrangement of the Continental services, constitute rather the exceptions which prove the rule, and convey the suggestion that it is only now and then that military requirements have to override public convenience.

Some thousands of our readers, including several contributors, are now serving their country in various ways, and there must be at least 20,000 railwaymen who have joined the colours, while their *confrères* who remain are doing a very big share in satisfying military and naval requirements. Yet, the general public is still able to travel about with almost the same convenience as formerly. The September time tables accord very nearly to the usual October arrangements, and in a few cases they are admittedly the winter services brought into force thus early owing to the reduction in public requirements. But nearly all the summer facilities are still available, though in some instances by ordinary trains instead of special ones, and with a few inevitable variations; and unless the situation suffers untoward developments, which hardly appear probable at this stage, there is good reason for suggesting that those of us who are not eligible for active service, or who are engaged in serving our country and our country's trade and industry at home, will find that there is much which our railways have to offer which can be turned to good account at this period.

Ordinary holidays are largely out of the question. Many seaside resorts have issued special announcements showing that they are perfectly safe and that holiday facilities are virtually, if not quite, normal; and there are some people whose position is such that the usual vacation, possibly somewhat belated, can be legitimately taken as usual. But in a majority of cases it is only possible to arrange for a few days away, or to take an occasional day or half-day so as to obtain some sort of a change from business, while in many instances such alternatives to the usual vacation are imperative by reason of reductions in income. We know of many instances where wives and families have migrated for two or three weeks to the coast or the countryside, while the business members

Digitized by Google

have taken short period season tickets to enable them to come up to town daily or several times a week.

For such circumstances all railways offer a wide choice of facilities, and attention may be directed to a selection thereof.

Cambrian Railways.—Owing to their unique position, sheltered as they are from the biting north and east winds by the Cambrian range of mountains, most of them facing either south or south-west, and enjoying as they do the direct warming influence of the Gulf Stream, the Cardigan Bay resorts are eminently suitable as places for winter residence. The climate is mild and yet invigorating, while the temperature is equable and not subject to those sudden changes which are so dangerous to persons in delicate health. The rainfall is below the average, and as the subsoil is of a gravelly nature rain quickly disappears and leaves the atmosphere dry and bracing. The meteorological records also serve to prove that the Cardigan Bay coast enjoys the maximum of sunshine, and it will thus be observed that all the essentials of a winter health resort are here present, and these combined with the added advantage of its closer proximity to London and the principal industrial centres, render it convenient not only for periods of continuous residence for the invalid, but for week-ends for the business man, who is thus enabled to recruit his flagging energies and to keep himself thoroughly fit during the trying winter months. The Cambrian Railways announce that the usual facilities for tourist and week-end, and long-period excursion tickets are available, and the usual winter service of trains will be in operation. During the month of October cheap day tickets are issued between the coast resorts.

Great Central Railway.—The Great Central is one of the few railways which has not curtailed its train service or cheap excursion facilities by express trains from London. Those who do not, this season, intend to visit the usual seaside resorts will no doubt spend their week-ends in the country while the favourable weather lasts, and of all the outlets to the North from London, the country through which the Great Central runs presents more of the virgin and unspoiled beauty than any other district so near town. The tourist in search of new ground for his week-end holiday could not do better than look for it in the delightful districts of Middlesex, Herts, and Beechy Bucks. Reference may here be made to a booklet issued by the Great Central Railway, "Strolls in Beechy Bucks," setting forth many of these tours, copies of which can be obtained by sending 2d. in stamps to the Publicity Office, 216, Marylebone Road, N.W. Cheap week-end, day and half-day tickets are issued to a large number of stations near London. There are also the Stratford-on-Avon, Rugby, Leicester and Nottingham excursions, and a wide variety of week-end and excursion bookings suitable for an absence of a few days.

Great Eastern Railway.—All the usual week-end, fortnightly (available for return by any train within 15 days) and tourist tickets continue in force, serving the coast resorts of East Anglia at very reasonable rates, as well as inland places of interest. The "Cathedral" tours, etc., as well as some of the long-distance excursions, are suitable for an absence of a few days, in default of a longer period. A good proportion of the usual excursion arrangements still apply, including not only cheap trips to seaside resorts, but also day and half-day visits to Cambridge, Ely, etc., and the half-day excursions to Clacton-on-Sea and Dovercourt Bay. A new arrangement is the issue of third-class tickets at 5s. and first-class at 7s. 6d. by the 5.3 p.m. (5.27 p.m. on Saturdays) express from Liverpool Street to Southend, this cost covering rail travel, tea on the down journey, over four hours at Southend, and supper on the return journey. Reference may also be made to the very cheap bookings to Epping Forest. This may be considered by some as well-trodden and uninteresting ground; but those who have traversed the forest area and visited portions other than those beloved of the Bank Holiday tripper have a different opinion, and a walk from Woodford, Loughton or Chingford to the other side of the forest at Epping Town is usually acknowledged to more than justify itself.

Great Northern Railway.—Apart from usual long-distance, week-end, excursion and tourist bookings, the various arrangements affecting the Lincolnshire and East Anglian coasts continue in force, and in addition to the well-known and favourite express excursions to Skegness, Sutton-on-Sea and Mablethorpe, and new ones to Spalding and other places, there are also corresponding facilities to places of inland interest such as Peterborough, Retford, Newark, Sandy, Biggleswade, St. Neots, Hertford, etc. Special mention may also be made of a series of 23 rambles described in a booklet entitled "Rural Rambles in the Northern Heights." Railway fares amount only to two or three shillings at the most, and this booklet, copies of which can be had, price 3d., from stations or offices or from the Advertising Department at King's Cross, gives detailed directions for rambles through fields and lanes, instead of keeping to the main roads.

Great Western Railway.—Serving the upper reaches of the Thames for many miles, Great Western arrangements admit of inexpensive trips up river being made in considerable variety, covering stations from Staines, Slough and Windsor, to Taplow, Maidenhead, Marlow, Bourne End, Goring, Pangbourne, etc. A number of motor and brake trips can also be combined therewith, while various rural districts, the Shakespeare country, and the south-western and other more distant counties are still served by week-end, excursion and tourist bookings affording a wide choice.

London and North Western Railway.—The new line to Watford, the main line as far as Tring and Cheddington, and the branches to Stanmore, Rickmansworth, St. Albans, Croxley Green and Aylesbury give access to beautiful country, and no fewer than 32 (actually 64, seeing that all are reversible) alternative arrangements for

Digitized by Google

walking or cycling rambles are available at a cost of from 1s. 2d. to three or four shillings, with 6d. or 1s. added for the conveyance of a bicycle by rail. There are also many day and half-day trips still in force, also Stratford-on-Avon excursions, etc.; while a good proportion of the usual short and long week-end tickets and some excursions to places further afield still apply, by ordinary trains if not by the special trains previously advertised.

London and South Western Railway.—Giving access to the beautiful riverside and country districts of Surrey and Hampshire, at Richmond, Staines, Kingston, Teddington, Cobham, Oxshott, Epsom, Leatherhead, Guildford and Haslemere, as well as further afield, the London and South Western Railway affords a wide selection of facilities suitable for a brief respite; and many of the usual arrangements, ordinary and excursion, to Portsmouth, Southsea, Bournemouth, the Dorset and Devon coasts, and to North Cornwall are also still available. On this line many of the principal express trains are now available for long-period excursions where it is not considered necessary to run the special trains hitherto provided. Week-end tickets are, of course, available by any trains on the dates covered; while the tourist and other arrangements will meet most requirements. In connection with the country rambles above suggested, no fewer than 160 rambles, walking or cycling, through the beautiful districts of Surrey, have been arranged at fares ranging from 1s. 6d. to a few shillings. Full particulars can be had on application to the enquiry office at Waterloo or at any station or town office.

London, Brighton and South Coast Railway.—Here the scenic districts rendered accessible by the trains of this company have much to offer. In previous numbers attention has been directed to the attractions of the Tunbridge Wells and East Sussex area. There is also the beautiful Midhurst branch, and the picturesque country served by Sutton, Epsom, Leatherhead, Redhill, Dorking, Box Hill, Guildford, Horsham, Three Bridges and other stations to many of which special facilities are operative. Then to Brighton, Eastbourne, Hastings, Portsmouth, the Isle of Wight, etc., other convenient arrangements still apply, while to supplement the railway company's own generous provision there are the Restall and Cook excursions, most of which are running more or less as usual.

Metropolitan Railway.—This railway shares with the Great Central Railway many of the facilities operative along the joint line from Harrow northwards, but as this is probably the most picturesque route out of London, it follows that the favourable arrangements offered by the railways concerned always repay utilisation. There are also facilities affecting the Uxbridge branch, and the particulars of the country rambles for which cheap through tickets are issued is well worthy of careful perusal, and for action prompted thereby.

The Metropolitan Railway announce that their popular day and half-day trips from London to the countryside are running as usual, and passengers may, without a change, travel by fast through trains from City stations to some of the finest scenery near London in Middlesex, Herts and Bucks. Cheap excursion tickets are issued on Mondays, Thursdays and Sundays to Chorley Wood, Chesham, Amersham, Great Missenden, Wendover, Aylesbury, etc., from Baker Street and all Metropolitan London stations, and on Saturday afternoon to Pinner, Northwood, Sandy Lodge and Rickmansworth in addition to those mentioned above. Excursion tickets are also issued for day and half-day trips on Thursdays and Saturdays to Eastcote, Ruislip, Ickenham, Uxbridge, etc., and on Sundays excursion tickets to these places are issued by all trains up to 5.42 p.m. from Baker Street. Cheap pedestrian tour and bicycle tour tickets are issued daily from certain stations to those desirous of travelling to one station and returning from another. Full particulars will be found in the Excursion Programme obtainable at all Metropolitan stations, or post free from the Commercial Manager, Baker Street station, N.W.

Metropolitan District Railway.—Although participating in the title of the "Underground," this railway serves picturesque country by its western branches, to Harrow, Hounslow, Richmond, Wimbledon, etc., and many of the special facilities arranged by the Publicity Department are well worthy of utilisation. The through trains to Southend, and the motor omnibus and tramway service arrangements in connection with the London Electric Railway and various stations may also be mentioned.

South Eastern and Chatham Railway.—Besides serving the numerous Kent Coast resorts from Whitstable and Herne Bay right round to Deal, Dover, Folkestone, Hythe, Sandgate, and to Hastings and the borders of Sussex, with substantially usual ordinary, special and cheap facilities still in operation, the Warlingham and Oxted, Reigate, Guildford and Reading, Kingswood, Swanley and Sevenoaks, Maidstone and other routes are the subject of many convenient and interesting traffic arrangements involving the expenditure of a few shillings only, though the country served is usually such as abundantly justifies the title of "The Garden of England." To the coast resorts day, week-end, 8 and 15 day and monthly tickets continue in operation.

Midland Railway.—Main line stations from Hendon, Mill Hill and Elstree to St. Albans, Harpenden, Luton and beyond are suitable for inexpensive and healthful trips, and there is a wide assortment of facilities for reaching the Peak District and other places further afield. The Southend route also has much to commend it, the usual cheap arrangements being still in operation.

———

So far we have been concerned mainly with the London district, but in the industrial districts, Nottingham, Sheffield, Birmingham, Manchester, Liverpool, Leeds, Bradford, etc., the railways already mentioned offer many facilities.

Digitized by Google

For example, the Lincolnshire coast is well served from the Midlands; and the country reached by the North Staffordshire Railway, the Peak District, the North Wales, Cheshire, Lancashire, and Yorkshire coasts, the Wirral peninsula, and even the Lake District are equally well served for the benefit of the people of the industrial districts further north, both by the railways previously referred to and by the Lancashire and Yorkshire, North Eastern, North Staffordshire, and the smaller railways concerned.

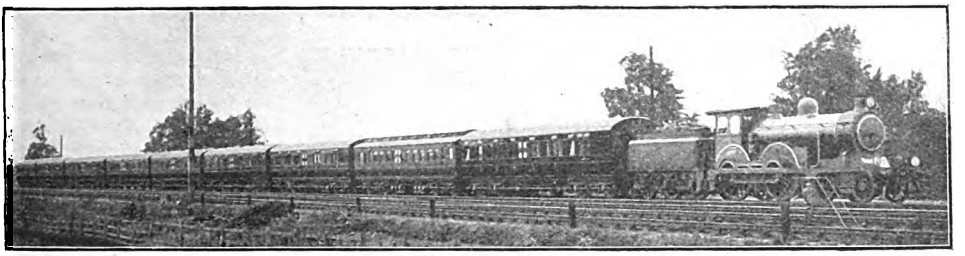
Cheap tourist tickets from England to Scotland will be continued until the end of October, although the weekly excursions cease at the end of September in Scotland. The summer excursions in Scotland are all withdrawn at the end of September, but the train service, although reduced to the winter time table from October 1st, is comprehensive, and will allow ample travelling facilities for anyone on holidays. The chief feature in Scotland at the end of the season is the excellent angling which can be obtained in the numerous lochs and rivers, and which this year will be better than ever. An excellent opportunity is also given to golfers, who can indulge in their favourite pastime over the famous Scottish golf courses at a time when there is no congestion, and it is well known that the early part of October is one of the best periods of the year for the game. It should also be mentioned that the charges for accommodation at the various hotels and boarding houses throughout the country are very much less than during the summer period.

In carrying out this policy the Caledonian Railway is offering very favourable facilities' and so long as conditions remain as favourable as they are at the time of writing there is no need why even a flying visit to Scotland should not be entertained by dwellers in southern towns; while for the people of the north there are abundant facilities more or less analogous to those suggested with reference to London and the English industrial towns.

The North British Railway directs attention to the fact that tourist tickets will be issued from stations in England to centres in Scotland, such as Edinburgh and Glasgow, until the end of October, and that a number of trips can be made from these points to various places of interest. Many tours, particulars of which appear in the comprehensive tourist programme issued by the North British Railway, can be taken advantage of, covering Loch Lomond, Glenfalloch and Callander; Fort William, Glenfinnan, Mallaig, Isle of Skye and Inverness; Hawthornden, Polton and Roslin; Dollar, Loch Leven, Newburgh and Dunfermline; Dunfermline, Loch Leven, Newburgh, Falkland and Aberdour; Dollar, Rumbling Bridge and Loch Leven; and Forth Bridge, Dunfermline and Alloa. The following tourist and golfing resorts can also be visited with advantage: the Clyde coast resorts; West Highland resorts; and North Berwick, Dunbar, Elie, St. Andrews and Gullane.

The Glasgow and South Western Railway, though with a prematurely reduced time table, also offers many facilities affecting the Firth of of Clyde, the Ayrshire coast, and the numerous golf courses for which its system is noted.

Digitized by Google



GREAT EASTERN RAILWAY AMBULANCE TRAIN.

Ambulance Trains on British Railways

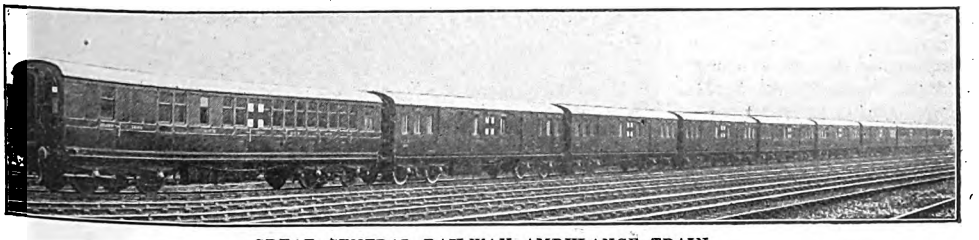
[No. I.].

IN the RAILWAY MAGAZINE for September we gave a diagram and particulars of the Great Eastern Railway ambulance train equipped by Mr. A. J. Hill, but several others can now be referred to, by the courtesy of the respective railway officers. These trains have already rendered good service.

The Great Central Railway have, at short notice, converted eighteen of their vestibuled bogie carriages, in order to form two separate ambulance trains of nine vehicles each. In each train beds are provided for sick officers and men, as well as day and sleeping accommodation for doctors, nurses and personnel. Each train is furnished with a complete pharmacy, treatment room, linen rooms, office, stores, hot and cold water, cooking appliances, lavatories, etc., together with five wards (replete with all needful appliances), each accommodating twenty men. The trains are equipped with dual brakes (to travel, if required, over any railway in Britain), together with electric lights and steam heaters (which can be controlled collectively or singly), and also with necessary fire appliances, etc. These trains were, we understand, the first to be handed over and brought into use by the War Office authorities.

Each coach is electrically lighted, current being supplied from an equipment fixed underneath the vehicle. The capacity of the batteries is such that they can supply light continuously for approximately 24 hours, even though the coach may be standing the whole of that time. When the coach is running the lights are supplied with current direct from the generator driven by means of a belt attached to one of the axles. The lights in the ward rooms are fitted with covers for the purpose of obscuring the light when necessary. The lights in the staff rooms are each controlled by a separate switch. The lamps in the treatment rooms are each of 25 candle power, and so arranged as to cause practically no shadows; in addition, portable hand lamps are provided. There are also portable hand lamps in each of the ward rooms.

The design, apart from details affected by the railway companies' own practice, is very similar to that of the Great Eastern trains, as is, indeed, the case with other ambulance trains equipped on various lines. There are nine coaches on each train. One end coach has accommodation for the guard, with compartments for two men, two doctors and two nurses, another compartment being converted into a staff mess-room and a fifth into a pantry. Next is a kitchen car, with pantry and three compartments where meals can be served. The third car constitutes a ward for 16 men, with a section partitioned off to receive four officers, the beds being arranged in pairs one above another along the sides, while the wide sliding doors permit of invalids being brought in on stretchers. Four other cars are arranged on the same system, but without partition, so that each accommodates 20 men. The fifth car contains a pharmacy, treatment room, office and clean and dirty linen compartments, while the last car is in compartments with beds placed transversely. All vehicles are steam heated, and the various divisions are suitably fitted up. The floor of the treatment room is covered with lead. All lights are fitted with green shades and can be turned out

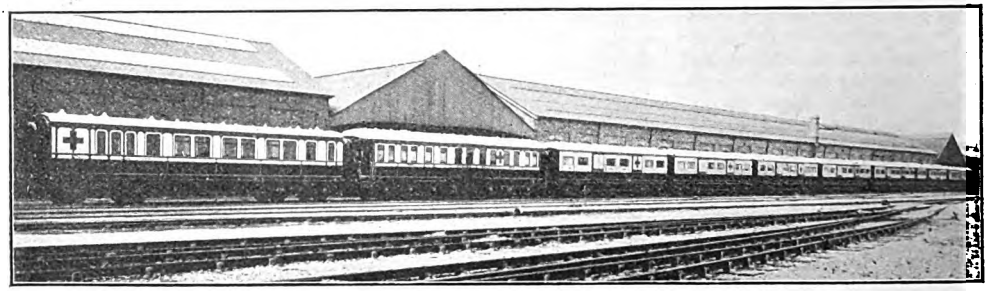


GREAT CENTRAL RAILWAY AMBULANCE TRAIN.

Digitized by Google

Digitized by Google

Digitized by Google

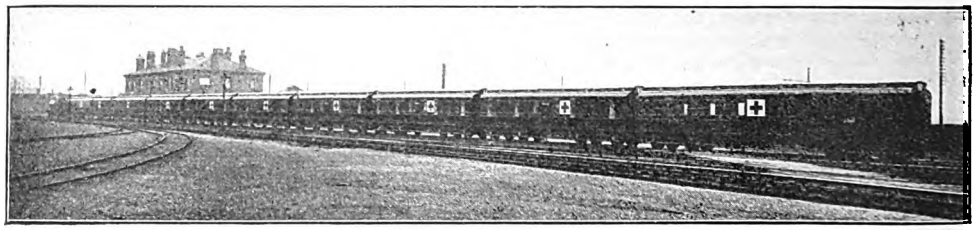


LONDON AND NORTH WESTERN RAILWAY AMBULANCE TRAIN.

mattresses. There is a total storage of about 1,000 gallons of water provided in each train. Apparatus in the ward-car lavatories is provided for sterilising excreta, dressings, and all infectious matter. The floors where necessary are covered with lead and rounded off to facilitate cleansing. The treatment room, in addition, has the walls lined with aluminium to a height of 3 ft. 1 in. The other floors of the vehicles are covered with linoleum.

The treatment room is provided with special sliding doors to allow of a stretcher being brought in from either end of the train. This room is also provided with shelves, table, racks, and cupboards, as well as water and special lighting facilities. All artificial lights can be screened as required or regulated from the inside of the various vehicles. The total length of each train is 481 ft. 10 in., and each vehicle has a large red cross painted on a white ground to indicate the purpose for which it is used.

(To be continued.)



MIDLAND RAILWAY AMBULANCE TRAIN.

Digitized by Google

PERTINENT PARAGRAPHS

British Railways and the War.

WHEN preparing the September RAILWAY MAGAZINE there was still a great deal of uncertainty as regards the public side of general railway transport; but even during the period between closing for press and actual publication there were many changes towards the restoration of railway facilities to a standard closely approximating to that of normal conditions and probably as nearly according to requirements as demanded by the altered public situation. In reference to the work of our railways in connection with military and naval traffic, a far greater factor than is realised, Lord Kitchener speaking for the first time in the House of Lords as Secretary for War, paid a well-deserved tribute to our railway companies and their staffs in the following terms:—

> "The railway companies, in the all-important matter of the transport facilities, have more than justified the complete confidence reposed in them by the War Office. all grades of railway services having laboured with untiring energy and patience. And it is well to repeat that the conveyance of our troops across the Channel was accomplished, thanks to the cordial co-operation of the Admiralty, with perfect smoothness and without any untoward incident whatever."

This applied mainly to the transportation of the first Expeditionary Force; but since then a great deal of other work has been done, including the conveyance of wounded soldiers and naval men from Southampton, and other ports to hospitals in London and elsewhere, the removal of invalids from coast stations to other places to leave the military and naval hospitals clear for sufferers returned from active service, and an extensive transfer of regulars, territorials and recruits about the country, in addition to sending reinforcements and stores across the Channel. What this traffic means can only be appreciated on the basis of the closure of certain lines and stations for a few hours or a day or more, as has occurred on various occasions in many districts; statements that one railway alone has loaded up, say, 50 trains on a particular day; and the appearance of foreign rolling stock in strange localities, as for example, North British and North Eastern vehicles on the South Eastern and Chatham, and Great Eastern or London and South Western carriages in Scotland. During the embarkation of the Expeditionary Force at Southampton the fullest capacity of the port was tested, but the elaborate machinery worked not only smoothly, but with perfect unity between military and civil interests. The thanks of the Admiralty have been warmly expressed to the port workers for their share in the task preceding the embarkation.

* * *

Official Notices and Announcements.

DATED August 20th, the Railway Executive Committee notified that the announcement issued at the commencement of the War, to the effect that passengers holding single journey and return tickets, also season tickets, might travel by the trains of any company running between the points for which the tickets are issued, would be cancelled on and from Monday, August 24th.

On August 27th, the Railway Executive issued the following notices:—

> "We are authorised to state that with regard to Army Reservists in railway service who have joined the Colours, the railway companies have arranged to supplement the Army pay and allowances in such a manner that the families will be maintained in circumstances which should avoid hardship during the absence of the breadwinner of the family. Occupants of the companies' houses will not be disturbed. This also applies to the families of Naval Reservists and Volunteers.
>
> "In addition, on the return of the men from active service, positions will be found for them on the railways equal to those they formerly occupied. If through any oversight any family finds itself in want of assistance, the attention of the railway company concerned should be at once called to the case."

An Army Order sets out the list of the defended harbours specially referred to in the recent Order in Council, providing for the institution of modified martial law, as follows: Cromarty, Aberdeen, Tay, Forth, Tyne, Tees and Hartlepool, Humber, Thames and Medway, Harwich, Dover, Newhaven, Portsmouth, Portland, Plymouth, Falmouth, Milford Haven, Swansea, Cardiff and Barry, Mersey, Barrow, Clyde, Lough Swilly, Belfast, Queenstown, Berehaven, Dublin, the Orkneys, and the Shetlands.

Speaking in the House of Commons, in reply to a question, Mr. Runciman, President of the Board of Trade, said: "His Majesty's Government have assumed the control of the railways

Digitized by Google

of Great Britain under the provisions of section 16 of the Regulations of the Forces Act, 1871. The individual companies retain the management of their lines subject to instructions issued by or through the Executive Committee which has been set up. No present payments are being made for services rendered to the Government."

* * *

Railway Companies and their Staffs.

RAILWAY companies have provided large contingents of regulars, territorials and reserve men, and without going into details it is safe to estimate that from 20,000 to 30,000 men have joined the colours from the railway service alone, while it must also be remembered that the men who remain are largely doing special service, their work in conducting the thousands of special trains involved by military and naval transport requirements being by no means a secondary factor.

On most railways announcements have also been made to the effect that until such time as service with the Colours terminates, the railway will, at their own expense, arrange for the continuance of membership of the Pension, and Widows' and Orphans' Funds, and of Provident societies. In districts where the concession of the supply of coal at cheap rates is in force, the families will be allowed the same privileges as heretofore. Arrangements will be made to supplement service pay and separation allowance by an amount based on the circumstances of the respective families, which will be kept under review during the period covered by the husband's absence.

It is notified by the various railway companies that they will continue to issue passes and privilege tickets to the wives and families of Reservists or Territorials who have been called out from the service in the present national crisis, exactly as though the men had remained in the employ of the railways. The usual order should be signed by the wife of the Company's servant for her husband and endorsed "wife of Army or Naval Reservist, or Territorial (as the case may be) called to the Colours." These orders, as well as similar orders issued by other Companies, must be accepted by the Stations, and tickets issued in exchange accordingly.

* * *

Resumption of Train Services.

THE most favourable feature of the situation, as far as the home railways are concerned, is the fact that, once the pressure of mobilisation had passed, so many railways reinstated nearly all the facilities which had been temporarily withdrawn, commencing at varying dates from August 17th onwards. Indeed, one may now say that, with a very few exceptions, at the time of writing conditions in this respect are nearly normal, and while all train services were not restored to the full summer level, they have been so far reintroduced that, during the latter part of August and the early weeks of September, facilities were substantially as complete as in June and early July, and virtually proportioned to the demands of the altered conditions.

It is, of course, impossible for entirely normal conditions to be restored while a state of war prevails, if only because the spending power of the British public is limited in many directions, and travel requirements differ considerably from those usually obtaining, while trade is very appreciably affected; but with the reintroduction of tourist, week-end, excursion and many other special facilities traffic has made a decided step forward. To compensate for many people whose holidays have been cancelled entirely, or whose employment conditions, going on active service, and other factors have prevented usual methods being followed, there have been many instances of deferred holidays being taken at this period instead, sometimes in the form of "Week-end Instalments."

Besides the usual bookings, most of the day and half-day trips have been reinstated, including Restall's, Cook's, and others arranged by private organisations. There were, however, a few variations. For example, in one of two instances the railway announcements of reinstatement of facilities included the statement that the tickets would be issued by trains after a specified time or available by any train on the day mentioned, with, in particular instances, certain exceptions. In one or two cases it was stated that tickets would be issued on the old basis except where the special trains to which the facilities specifically applied were not being run.

On the whole, however, the situation became as nearly normal as it is likely to be under war conditions. Indeed, on analysis, it will be found that although particular facilities were given by ordinary instead of special trains, and certain important summer expresses were not reinstated at all, what was done amounted to the restoration of train services to a level which is in about the same proportion to the usual summer standard as travel requirements bore to what would have been the case under other and more favourable conditions. That is to say, those trains which disappeared for good could not have justified themselves, while the public was provided with facilities at least as good as those which existed in June and early July, with very nearly the full summer standard in particular instances.

October usually witnesses considerable reductions in train services, although travel facilities are nearly as complete and generous as during the summer months. Consequently the October schedules indicate less markedly the effect of war conditions. In this connection attention may be directed to a special article on another page dealing with the facilities offered by the various railway companies during the autumn, and notwithstanding the adverse effects of the situation created by war conditions. It must, however, be pointed out that these and other aspects are liable to be affected by any untoward developments, but at the time of writing there is no indication of action of this class.

Digitized by Google

Military Traffic Movements.

A FEATURE of the military traffic has been the extensive use of various connecting lines, such as the East London, North London, West London, West London Extension, North and South Western Junction, Tottenham and Hampstead, and Tottenham and Forest Gate Railways, as well as short sections such as those between Norwood Junction and Beckenham, the Crystal Palace and Beckenham, and the widened lines of the Metropolitan Railway between Farringdon Street and King's Cross and the connection with the South Eastern and Chatham Railway at Ludgate Hill. Most of these have been very busy, and their importance is emphasised by the fact that they are specially guarded, and that at times very heavy traffic has passed over them. Recently the East London was closed entirely for several hours as regards ordinary traffic, to enable troop and military trains to be worked *via* Liverpool Street to the South Eastern and Chatham and London, Brighton and South Coast Railways. On Saturday, 15th August, also on Tuesday, 18th August, and until noon on Wednesday, 19th August, the Bow and Poplar section of the North London Railway, with the Great Eastern Victoria Park Stratford route, was closed entirely. By these routes, using the Kingsland loop, trains can be run directly over the North London and the various railways connecting therewith between the Great Northern, Great Eastern, Midland, London and North Western, Great Central, Great Western, London and South Western, London, Brighton and South Coast, and South Eastern and Chatham Railways. The West London and West London Extension lines, with the North and South Western Junction Railway, have also proved of exceptional value. Interchange stations such as Peterborough, Basingstoke, Salisbury and other centres, besides the principal junctions, have also witnessed a great deal of transfer traffic.

On Sunday, August 30th, the whole of the North London Railway was closed for ordinary traffic as well as the Victoria Park-Stratford section of the Great Eastern Railway, in order to facilitate military traffic movements. Also on the Monday morning following traffic did not commence between Victoria Park and Stratford until 9.15 a.m., while until noon the only trains into Broad Street were those from the Great Northern Railway, from Willesden Junction (Low Level) and Chalk Farm, and the London and North Western main line trains. Moreover, when traffic was recommenced *via* the Hampstead Junction line the only trains were those to and from Richmond, running half-hourly without the business extras, and no trains ran to Kew Bridge.

Again on Monday, September 7th, from about 3 p.m. until Tuesday afternoon these sections were again closed, only the Chalk Farm and Willesden Junction and the Great Northern services being run during this period; while the London and North Western trains were reduced on Monday and discontinued altogether on the Tuesday.

Special Phases of the Railway Situation.

ON Monday, August 31st, a number of the restaurant cars were again placed in service on the Great Eastern Railway, and others, provided for by cars making the down journey on the Monday, commenced to run the following day. On the Monday also the service to Antwerp *via* Harwich was provisionally reinstated. The steamers left Parkeston Quay, Harwich, at daylight on Mondays, Wednesdays and Saturdays. Intending passengers had to travel by the 8.40 p.m. on Sunday night or the 7.13 or 8.45 p.m. trains on Tuesday and Friday evenings, and stay the night on board the steamer. The service was, however, only a provisional one, with the restriction that British subjects only would be conveyed, at their own risk, and possessing passports issued by the Foreign Office.

For strategic reasons the service of trains between Boulogne and Paris ceased on Saturday, August 29th. At Folkestone cross-Channel steamers arrived from Boulogne, Dieppe and Ostend. On Tuesday, September 1st, nine boats came in during the day to Folkestone, and there were 2,500 passengers from Dieppe alone. The various Continental services have also suffered modification at various dates.

The Midland Railway service between Belfast and Heysham was resumed at an early date. Great Western day and night services between England and Ireland *via* Fishguard and Rosslare were resumed on Monday, August 24th. Subject to certain accommodation reserved for Government requirements, the Southampton Docks of the London and South Western Railway were again opened to public business of all kinds during the latter part of August.

For the first time an Atlantic liner, the Cunard steamer *Ascania*, left the Newport docks of the Alexandra (Newport and South Wales) Docks and Railway on August 20th for Montreal. The construction of the new lock entrance recently described in the RAILWAY MAGAZINE rendered it possible for the *Ascania* to be dealt with there instead of at Southampton. The *Ascania* has a net register of 5,699 tons and a gross register of 9,111 tons. She has accommodation for 1,700 passengers and 210 crew. Arrangements were made with the Great Western Railway to run special trains to the side of the liner, and some 260 cabin passengers and between 800 and 900 third-class passengers booked from Newport.

The Great Central Railway steamers *City of Bradford*, *City of Leeds* and *Bury* are detained at Hamburg with their crews as prisoners of war.

* * *

Train Service Modifications.

On Monday, August 31st, the London and South Western Railway issued a notice to the effect that from that date onwards the passenger train service would be as advertised in the summer time-tables, with certain exceptions. The list of exceptions is not really a very serious one, and amounts largely to the adaptation of the train services to the requirements of the

Digitized by Google

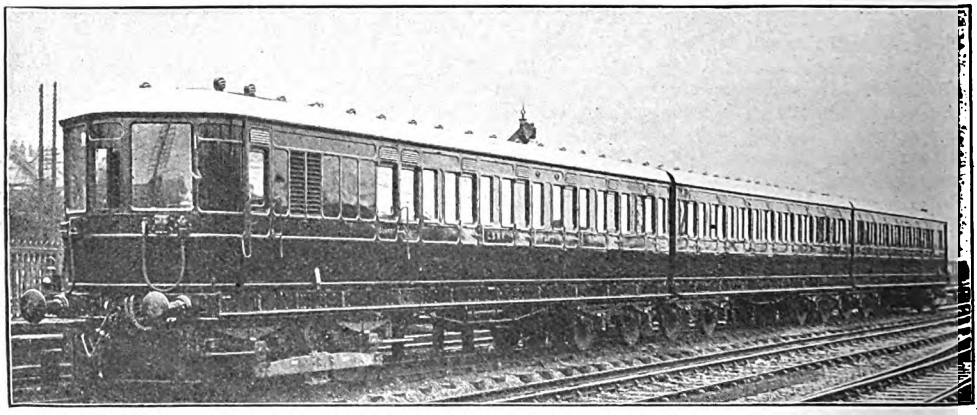
present. A notable withdrawal was, however, the 4.10 p.m. two-hour train from Waterloo to Bournemouth. It was stated that the Fratton and East Southsea service "will not be restored," also the services between Lee-on-the-Solent and Fort Brockhurst. The 10.30 p.m. train from Waterloo gave steamer connections with Havre, and on Mondays, Wednesdays and Fridays with the Channel Islands. In each case passengers had to stay on board overnight, the boats leaving Southampton at 4 a.m. For the Southampton and St. Malo and Cherbourg services and between Jersey and France, travellers were referred to special announcements. Between Portsmouth, Southsea and Ryde a special time-table of boats was advertised. During darkness they run only between Southsea and Ryde, but otherwise all served Portsmouth Harbour.

Commencing Sept. 1st, the 12.25 p.m. (*via* Harrogate), 2 p.m., and 10.35 p.m. train from Edinburgh to London (King's Cross), and the 11.20 a.m. (*via* Harrogate), and 7.55 p.m. trains from London (King's Cross) to Edinburgh were discontinued. An additional train left Newcastle for York at 4.50 p.m., stopping at Darlington and Northallerton. The 2.20 p.m. train from Edinburgh to London (King's Cross) stops at Berwick, and the 10.50 p.m. train from Edinburgh to London (King's Cross) stops at Berwick at 12.16 a.m., except on Monday mornings. A service to the Highland and West Highland lines is given by the 8.15 p.m. train from London, King's Cross (Saturdays excepted). The 8.15 p.m. train from London (King's Cross) to Edinburgh is discontinued on Sundays. The 11.45 p.m. train from London (King's Cross) to Edinburgh is discontinued on Saturdays, and on other weekdays and on Sundays does not run beyond Newcastle. The 10.53 a.m., 11.57 a.m., and 2.52 p.m. trains from Scarborough to York, and the 2.20 p.m. and 2.52 p.m. trains from York to Scarborough are discontinued. The 11.25 a.m. from London (King's Cross), the 2.15 p.m. from Sheffield (Mid.), and the 1.5 p.m. from King's Cross have been discontinued. The 9.10 a.m. train from Hull (Riverside Quay) to London (King's Cross) is discontinued.

* * *

Electrification Progress on the London and South Western Railway.

CONDUCTOR rails have been laid over a length of 52¼ miles in the Kingston circular route which constitutes the first stage of the London and South Western electrification works. On the East Putney section provision is being made to allow this line to be used both by District trains operating on the third and fourth rail system, and by South Western trains, for which no fourth rail is employed, the method adopted being to bond one of the track rails which will serve as the negative rail. On the Hounslow section conductor rails have been laid over about 10 miles, while on the Shepperton line the conductor rails have been fixed over the whole length. One of the electric trains has undergone trials on the Putney-Wimbledon section with satisfactory results. The rolling stock is being provided by the conversion of existing stock at the Eastleigh carriage works. The first train is illustrated above.



THREE-COACH UNIT FOR LONDON AND SOUTH WESTERN RAILWAY ELECTRICAL SERVICES.

They are in three-coach sets, with guard's and luggage accommodation and ordinary compartments for first and third class passengers, providing seats for 190 persons. The driver's compartments at each end are formed with curved ends having wide windows. The end bogies of each train unit are each provided with two 275 h.p. motors, so that additional vehicles can be hauled when required, while two sets can be coupled and operated on the multiple-unit principle. Conductor rails are of flat-bottomed section, weighing 100 lbs. to the yard, and are carried on porcelain insulators.

* * *

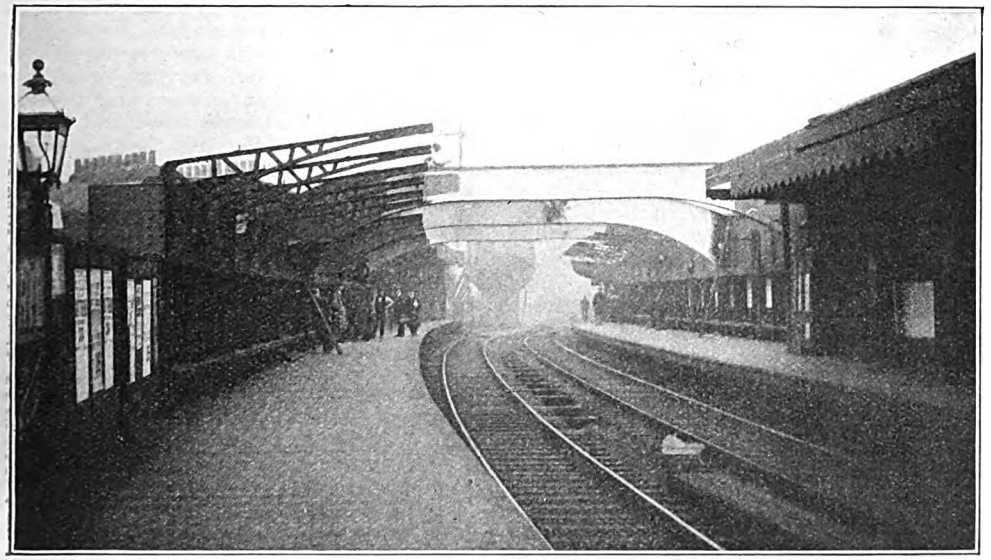
Bridge Strengthening on the Great Eastern Railway.

THE bridge which carries the Great Eastern Railway across Commercial Road at Stepney

Digitized by Google

station has always ranked as an exceptionally interesting one, owing to the long skew span involved, and the fact that the platforms are also supported by the bridge girders, and the railway itself is on a sharp curve. It has, however, become necessary to strengthen the main girders in order to enable the bridge to carry present day loads with safety, by no means an easy proposition in view of the fact that the clear span is 130 ft., and the work includes two roads on a curve, and two platforms with awnings.

The method adopted was to place strengthening booms on top of the old main girders, with cross girders between, and the photograph reproduced shows the work nearing completion. We are indebted to Mr. Harry Jones, Chief Engineer, Great Eastern Railway, for this illustration, as also for particulars of the work involved.



STEPNEY STATION, GREAT EASTERN RAILWAY, SHOWING STRENGTHENING GIRDERS IN PLACE READY FOR THE RE-ERECTION OF THE PLATFORM AWNINGS.

Owing to the somewhat unusual design the cross girders were strengthened without adding more plating. The main girders are strengthened by the addition of new top booms of a box section, extending the whole length of the girders, and attached to the old booms by rivets, thus considerably increasing the depth. The old main girders are amply supplied with plate and angle gussets, to which the cross girders are attached by means of very large gusset plates, as shown on cross section. It was noticed that the cross girders (which are 43 ft. long and only 3 ft. deep) deflected so as to cause the main girders to lean inwards when the trains passed; but by means of these long connecting gussets the cross girders have been given additional strength by placing three large overhead struts in between the main girders over the lines, thus adding considerably to the strength of the cross girders by converting them into girders whose ends may be regarded as rigidly fixed.

This bridge has now been converted into an up-to-date structure, with small relative expenditure. The designs were by Mr. W. H. Tomkins, M.Inst.C.E., assisted by Mr. H. E. Stratton, A.M.Inst.C.E., under the direction of Mr. Hy. Jones, M.Inst.C.E., Chief Engineer, Great Eastern Railway.

* * *

A Smart Piece of Railway Engineering.

On July 13th the Highland Railway resumed the running of trains over their Aviemore direct line. It will be recalled that owing to the destruction of the arch bridge over the Baddengorm Burn, near Carr-Bridge, by a cloudburst of an unprecedented and unparalleled magnitude, this main route was closed for traffic. Energetic measures were at once adopted to secure the early opening of this important route. On the day following the accident over 100 of the railway company's men were at work clearing away débris and preparing for the foundations of the new bridge, the character and design of which had already been decided upon by the Company's engineer-in-chief, Mr. Alex. Newlands. As soon as possible arrangements for the concrete work of the foundations and abutments were made with Messrs. MacAlpine & Sons, who, by the Tuesday following, had a large staff of men and steam plant busily engaged at work. Under the personal direction of Mr. Robert MacAlpine and his manager, Mr. MacDonald, this work proceeded continuously night and day, and the contract for the new steel bridge having been

Digitized by Google

placed with Messrs. Orr, Watt & Co., bridge engineers, of Motherwell, this part of the work was pushed forward with commendable dispatch, the entire bridge being completed and on wagons within one week. The girders were placed in position on Monday, July 6th, and by the end of the week the wingwalls and the embankments were completed and the permanent way laid across, and the line was opened for traffic, as stated.

The new bridge is of 26 ft. 6 in. span and carries the railway at a height of about 32 ft. above the bed of the burn. The foundations have been carried down in places to a depth of 7 ft., and these, as well as the abutments and wingwalls, are of mass concrete work, train loads of material for this purpose being run to either side of the bridge continuously. The steel superstructure consists of two main girders carrying a corrugated steel deck with handrails. It is believed that in building a complete bridge of this magnitude in three weeks a record has been established, and the work as a whole reflects highly upon the administration and energy of the contractors and their staffs. The work was during the entire period under the personal supervision of the Company's chief engineer, Mr. Alex. Newlands, and his assistant, Mr. MacMurdo, and others of his staff. The Chairman, Mr. R. M. Wilson, and the Directors of the Company visited the work on several occasions and manifested keen practical interest in the progress that was being made.

Lieut.-Colonel Druitt's report to the Board of Trade in reference to the collapse of the bridge, now replaced as described above, shows that the disaster was due to phenomenal and unique factors which could not possibly have been taken into account in designing the bridge. He states that "it is evident, from the enormous fall of water that came down the burn from its very small drainage area, that this was not a flood in the ordinary sense of the term, but that the trouble was due to an aerial disturbance of quite a phenomenal and unprecedented character. The bridge itself was of solid construction, but the possibility of a sudden rush of such a large volume of water through it could never have occurred to those responsible for the design and erection of the bridge in question, or no doubt foundations of a different character would have been provided."

* * *

Association of Railway Stores Superintendents.

THE Association for Railway Stores Superintendents, recently formed, consists of representatives of practically all the railways in Great Britain and Ireland. The chief objects are to promote the interests of railway companies in matters connected with the purchase and storage of railway stores and materials. This will be achieved by the interchange of information as to markets, conditions of purchase, etc., and, in addition, the views and experiences of the various members will be brought out by the reading and discussion of papers on matters connected with purchase, manufacture, sale, storage, and distribution of material. Mr. W. H. Stanier, Stores Superintendent, Great Western Railway, has been elected Chairman and Mr. C. A. Plaister (Great Western Railway, Swindon) secretary and treasurer, for the ensuing year.

* * *

The Government and the Railways.

THE Board of Trade have issued the following notice:—

"The Regulation of the Forces Act, 1871, under which his Majesty's Government have taken possession of most of the railways of Great Britain, provides that full compensation shall be paid to the owners for any loss or injury they may have sustained thereby, the amount of such compensation to be settled by agreement, or if necessary by arbitration.

"His Majesty's Government have agreed with the railway companies concerned that, subject to the undermentioned condition, the compensation to be paid them shall be the sum by which the aggregate net receipts of their railways for the period during which the Government are in possession of them, fall short of the aggregate net receipts for the corresponding period of 1913. If, however, the net receipts of the companies for the first half of 1914 were less than the net receipts for the first half of 1913, the sum payable is to be reduced in the same proportion.

"This sum, together with the net receipts of the railway companies taken over, is to be distributed amongst those companies in proportion to the net receipts of each company during the period with which comparison is made.

"The compensation to be paid under this arrangement will cover all special services, such as those in connection with military and naval transport rendered to the Government by the railway companies concerned, and it will therefore be unnecessary to make any payments in respect of such transport on the railways taken over."

As we go to press attention is also drawn to the fact that several railways have found it necessary to offer slight restrictions upon enlistment from the railway service. This is explained by the possibility that if enlistment continues to the same extent as it has done the working staffs, so essential for national transport, may be seriously and possibly prejudicially depleted. Hence the issue of notices such as the following: "Notice is hereby given that the War Office have given instructions to recruiting officers not to accept railwaymen unless they produce a letter of assent from their superior officers." Any man who can be spared obtains a letter at once, but here and there it is necessary to reserve permission. A notice issued by the Great Eastern Railway, signed by Mr. Thornton, effectively expresses the real position: "The directors and officers of the company desire to express their best wishes to those of the company's employés who have already so nobly responded to the call of their country. At the same time, those whom circumstances force to remain in their present position should be regarded as performing a most important service to the nation."

Digitized by Google

It is expected that by the end of the present year it will be possible to commence through running between the Elephant and Castle and Watford. Work on the London Electric extension from Paddington to Queen's Park is well forward, and between Queen's Park and Willesden the widening works are now reaching the final stages. Queen's Park station will have six platforms, with car sheds adjacent for the joint stock. A new station is being constructed immediately east of the Kensal Green tunnels, and two new tunnels are being made. The London and North Western station at Chalk Farm is being demolished, the intention being to deal with all local traffic at the North London station. Except the down fast line the whole lay-out is being re-arranged. To avoid crossing on the level, the new down electric line will be in tunnel, coming to the surface again at Loudoun Road. The up electric line will also be in tunnel between Loudoun Road and Chalk Farm. In each case there will be junctions with the North London lines. The existing line for ordinary slow traffic is being re-arranged to pass under the up fast line, which will be carried by a steel girder structure 400 yards long.

* * *

We regret to announce the death, at the age of seventy-seven, of Lord Merthyr, Managing Director of the Cardiff Railway Company, and whose name will always be associated with the Bute Docks undertaking and the development of the South Wales Coal Industry. He was born at Merthyr Tydfil on August 5th, 1837. On completing his apprenticeship he commenced his long connection with the Bute Estates, and when only twenty-seven years of age was appointed manager of the Bute Mineral Estate, eventually becoming general manager of the Bute Docks, as well as of the Bute estate and collieries. In later years his position has been that of Managing Director, the position of General Manager of the Cardiff Railway being now held by Col. C. S. Denniss. In 1885 he was created a Knight Bachelor in recognition of his signal services to the South Wales coalfield. In 1896 he became a baronet, and upon the accession of King George V. to the throne Sir William was made a peer, with the title of Baron Merthyr of Senghenydd, County of Glamorgan, in the peerage of the United Kingdom.

* * *

Lieut.-Col. Druitt's report to the Board of Trade in reference to the accident, fortunately not a serious one, which occurred near Carlisle on July 20th, when the 11.20 p.m. Caledonian express from Glasgow overran signals and collided with the rear of the 11.30 p.m. North British express from Edinburgh, reveals a brake failure of an almost unprecedented character. The failure of the air pump on Caledonian engine No. 143 was due to a broken joint in the steam pipe between the governor and the air pump. It was found that the right and left handed screw nut uniting the pipe between the governor and the air pump was missing, the pipes being thus disconnected so that no steam could reach the pump. On account of a complaint having been made that the air pump on engine No. 143 was not working satisfactorily, a fresh one was fitted to the engine on July 15th. During following days the connections gave further trouble, and on the day of the accident the engine had to come off at Carstairs. Repairs were there made, but a nut in the steam connection came off after the engine had run a distance of about 65 miles to Gretna Junction. Had the train not been checked several times by signals the driver would have been able to bring the train into Carlisle, but as it was, notwithstanding the action of the guard, he overran the signal and collided with the train in front, owing to depletion of the air in the reservoir. The report concludes with the statement: "I understand that no previous case of a similar nut having been lost is known, and the only reason that can be suggested for this one coming off, is that it was not properly screwed up in the shops at Carstairs before leaving, but Fitter R. Watson, who made the joint, is quite sure that the joint was correctly made by him. As the nut cannot be found, the reason of the failure must remain in doubt."

* * *

Major Pringle's report in reference to the collision which occurred at Cannon Street station on June 27th, indicates very markedly the difficulties of traffic working at the station, though no serious accident had previously occurred there for many years, affording evidence of the carefulness with which the traffic is usually conducted by all concerned. Driver Harman, of the Hastings train, had twenty-six years' experience as an engine driver, and stated that he was thoroughly acquainted with the signalling and lay-out at Cannon Street. Major Pringle considers that "his initial mistake was 'taking it for granted' that his train would be signalled out upon No. 8 road. Whatever may have been

Digitized by Google

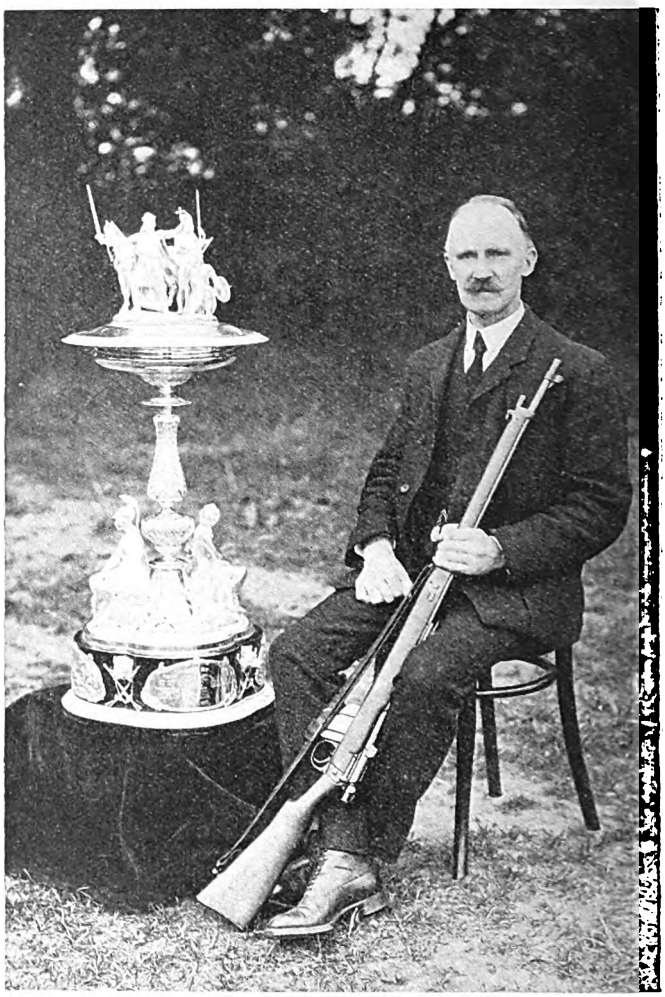
the cause, he was so obsessed with the idea that he neglected to observe the indicator, which has been specially fitted to give drivers information with regard to the route they have to follow. His second mistake was misreading the advance signals on No. 8 'out' road. There are three posts on the bridge carrying these advance signals. Harman admits that the centre of the three signals was the one which he saw had been lowered, and which he thoughtlessly took as applicable to himself."

* * *

LT.-COL. VON DONOP'S report to the Board of Trade in reference to the collision which occurred on June 17th at Reading station, Great Western Railway, is somewhat unusual in style, in that the evidence is largely set forth in dialogue form, owing to the course followed at the inquiry. The Inspector comes to the conclusion that the fireman of the engine of the excursion train—the driver and fireman concerned had only just relieved the men who came from Taunton—did see something which might be interpreted as a flag signal to start, as this may have been due to the action of the guard who was stopped by the stationmaster in the act of giving a right-away signal, but did not complete this action. But, even if a green flag signal which the fireman was justified in taking as the guard's starting signal was given, that did not of itself by any means justify Driver Churn in starting the train, and in this respect both the driver and fireman are severely censured. The obligation was on both of them to observe the signals themselves, irrespective of any instructions from the platform staff.

* * *

MR. BLANDEN, the well-known station superintendent at Marylebone, Great Central Railway, succeeded in carrying off the Donegall Cup, together with the Donegall Gold Badge and money prize of £10, in a Service Rifle competition at the recent meeting of the National Rifle Association at Bisley. Mr. Blanden's portrait was given in an article describing Marylebone station and its traffic, published in the RAILWAY MAGAZINE for October, 1911, and now, by the courtesy of the Editor of *The Great Central Railway Journal* we are able to reproduce a photograph showing him in charge of his rifle and the Bisley prize which he has earned. It is nearly thirty years since he served as a Volunteer. Upon joining the Marylebone (Great Central) Company of the National Reserve two years back, he took up miniature practice in the Rifle Club formed by the Company's staff at Marylebone. After several months of persistent endeavour he began to make good scores, and on joining the Marylebone (Borough) Rifle Club last season, took their gold, silver and bronze medals, besides other trophies, and in the Marylebone Battalion National Reserve Club won the Class "A" Club Championship. Later he took up full range practice. His success is the more noteworthy seeing that he had to compete with several hundreds of the best shots of the day, including at least four King's Gold Medallists. The "Donegall" competition consisted of seven shots at 300 yards and ten at 600 yards. At the first range Mr. Blanden put



MR. BLANDEN, STATION SUPERINTENDENT, MARYLEBONE, GREAT CENTRAL RAILWAY.

Winner of the Donegall Cup and other prizes at the Bisley Meeting of the National Rifle Association.

Digitized by Google

on the full score of 35 points. At 600 yards he made a string of 9 bulls, and then dropped one point on the last shot, thus making a total aggregate of 84 out of a possible 85 points. Two other competitors made similar scores, necessitating a "tie" shoot, in which Mr. Blanden scored 3 bulls (15 points) against his opponents 14 and 13 respectively.

* * *

MR. J. L. CLEWES, General Manager and Accountant of the Derwent Valley Light Railway, has been appointed General Manager and Secretary of the Londonderry and Lough Swilly Railways, in succession to the late Mr. Andrew Spence. Mr. Clewes had wide experience on the Midland Railway prior to leaving the Derby headquarters for York, two years ago, to organise and establish the new Derwent Valley Line, opened in July, 1913. It is now in full working order for all classes of traffic, and has rapidly proved its worth to the farming community. Mr. Clewes takes up his new duties on October 1st.

* * *

AT the general offices of the Alexandra (Newport and South Wales) Docks and Railway Company a presentation was made recently, on behalf of the officers and staff of the Alexandra (Newport and South Wales) Docks and Railway Company, to Captain W. E. Langshaw, late Assistant Superintendent, on his leaving to take up the appointment of General Manager of the Birkenhead Ferries.

* * *

THE Railway Club programme of London meetings for 1914-5 is as follows:—October 13th, "History of the Great Central (late M.S. & L.) Railway," Rev. W. J. Scott, B.A.; November 12th, "The Cheshire Lines Committee," Basil Mercer; December 8th, "The West Highland Section of the North British Railway" (with lantern views), J. B. Sherlock; January 12th, Annual General Meeting—"Railway Nationalisation; is it Desirable, Practicable, or Probable?" J. F. Gairns; February 9th, "The Railways of Wales," H. L. Hopwood; March 9th, "Anglo-Scottish Train Services," C. J. Allen; April 13th, "Characteristics of Swiss Railways" (with lantern views), E. J. Miller; May 11th, "Some Early Railway Maps," G. W. J. Potter; June 8th, "The Aim of the Model Railwayist," W. R. S. Smart. On September 15th, Mr. A. W. Bartlett opened the sessions with a paper on "Bournemouth and its Railway Facilities,"

* * *

MR. J. G. Robinson is adding to the *Glenalmond* 4-6-0 mixed traffic class, three more, to be numbered 439, 440 and 441, being now in hand at Gorton Works, Great Central Railway. They will be fitted with a top-feed arrangement, and will have Mr. Robinson's patent collapsible valves in place of the cylinder release valves fitted to previous engines of the same type. A new type of combined blower and steam circulating valve is also to be fitted to replace the retarder jets previously fitted to superheater boilers. A new construction of relief valve is also to be fitted to the cylinders. A new design of locomotive is also in hand; it is to be used for mixed traffic, and will be a tank engine of the 2-6-4 type. Diameter of driving wheels will be 5 ft. 1 in., and cylinders 21 in. diameter by 26 in. stroke.

* * *

THE death is announced of Mr. Jules Nagelmackers, President of the International Sleeping Car Company and head of the banking house of Nagelmackers & Sons, of Liége and Brussels. He was taken ill in Paris, and was subsequently removed to his country residence, the Chateau d'Angleur, in the immediate vicinity of Liége. Unfortunately, the chateau was in the very centre of operations immediately after the German Army marched into Belgium, and Mr. Nagelmackers died in the midst of a furious bombardment of the neighbouring forts. His brother, Georges Nagelmackers, who died some few years ago, was the founder of the Wagons-Lits Company.

* * *

THE Board of Trade have recently confirmed the undermentioned Order made by the Light Railway Commissioners:—"North Devon and Cornwall Junction Light Railway Order, 1914, authorising the construction of a Light Railway in the County of Devon from Torrington to Halwill, including the reconstruction of part of the mineral line known as the Torrington and Marland Railway."

* * *

ACCORDING to a Consular report just issued, the total number of passengers conveyed from Dover to Calais in 1913 was 209,503, being an increase of 23,553 over the number carried in 1912. From Calais to Dover 198,692 passengers were carried, a decrease of 4,727 as compared with 1912. The total number both ways was 408,195, an excess of 18,826 over the 1912 figures, and 35,734 more than in 1911.

* * *

DURING the continuance of the war subscribers to the *London and South Western Railway Gazette* who are called up for service with the Colours will be allowed to continue their subscriptions, and will be entitled to the benefit of 9s. per week paid for temporary disablement caused by wounds or injuries received in defence of their country, and a donation of one guinea will be paid to the family of every subscriber killed whilst on active service. The Editor expresses his regrets that it has not been found possible to pay out of the moiety remaining a larger sum for each man who may be killed.

* * *

AN appeal is made on behalf of the London and South Western Railway Orphanage, the funds of which are being seriously depleted, owing to the diversion of many usual subscriptions in other directions. The annual Sale of

Digitized by Google

Work is necessarily postponed, but parcels of clothing will be greatly appreciated if sent to the Orphanage at Woking. All children who are rendered fatherless by the war will, if of an eligible age, be admitted in due course to the Orphanage if passed by the Medical Officer.

* * *

IN reference to a paragraph recently published on the subject of high speed near London, a reader mentions that he has recorded the speeds at various stations close in as follows:—

G.N.R.	Wood Green ..	78·5	m.p.h.
,,	Hornsey	75	,,
M.R.	Hendon	75·7	,,
G.W.R.	Acton	74	,,

* * *

THE Metropolitan Railway has added to its exhibit of automatic signalling at the Anglo-American Exhibition at Shepherd's Bush a collection of flint and domestic implements representing a variety of pre-historic relics found during the working of the gravel pits and elsewhere near Rickmansworth station.

* * *

THE Erie Railroad Company recently made a test at Binghampton, N.Y., of the tractive power of the famous "Triplex" locomotive, recently illustrated in these pages. This has twenty-four driving wheels, eight of them being under the tender to secure additional driving power. The officers in charge kept adding car after car of coal to the train until it consisted of 250 fully loaded steel "battleships," with a total weight of 21,000 tons. The locomotive pulled a train of 250 fully-loaded steel cars with a total weight of 21,000 tons for 40 miles, establishing, it is said, a new train-load record, not only for American roads, but also for roads anywhere in the world.

* * *

OUR attention is directed to a notable bridge replacement carried out on the Victorian Government Railways, the work in question being Maribyrnong (formerly Saltwater) River bridge, between South Kensington and Footscray, Melbourne. The old bridge consisted of three girders, one heavy middle span and two lighter outside ones; the total length being 216 ft. In 1911 it was determined to do away entirely with the old box-girder bridge, by replacing it with a modern lattice-girder bridge. There were special reasons which made it necessary to exercise the utmost care in doing the work, the main one being that the bridge carried over 320 trains a day during ordinary traffic conditions. The stoppage of running over the bridge would have meant the cutting off of all the Victorian Railways traffic to the west of the Bendigo lines. No attempt was made to provide any temporary diversion; and, in addition to the total renewal of girders, the line at the bridge had to be lifted 5 ft. 3 in. during the progress of the works. The methods adopted are described in detail in our Australian contemporary, *The Commonwealth Engineer*.

MR. S. WILLIAMSON, General Manager, Cambrian Railways, has, with the approval of His Majesty the King, been awarded the vote of thanks of the Grand Prior and the Chapter-General of the Order of the Hospital of St. John of Jerusalem in England, engrossed on vellum, for distinguished services rendered to the St. John Ambulance Association.

* * *

MR. W. T. D. GRUNDY, chief goods clerk at Morecambe, Midland Railway, has been appointed to succeed Mr. J. L. Clewes, as General Manager and Accountant of the Derwent Valley (Yorks.) Light Railway. Mr. Grundy entered the Midland service as a clerk at Bingley, Yorkshire, in April, 1892, and was transferred to the district goods manager's office at Leeds in October, 1903. In March, 1911, he was temporarily removed to Leicester, and was made chief clerk at Morecambe in November, 1911. Mr. Grundy is thirty-seven years of age.

* *

WE are informed that, up to date, 118 men from the works and offices of the Westinghouse Brake Company, Ltd., have joined the colours, representing upwards of 28 per cent. of their normal establishment. The Westinghouse Brake Company, Ltd., is paying these men half rate wages, and has agreed that all who return to them on the expiration of such service will find their places open for them.

* * *

CONSEQUENT upon the death of Mr. Ernest Winmill, Locomotive Accountant, Great Eastern Railway, Mr. Alfred James Snow, Assistant Accountant, has been appointed to the vacant post. Mr. David Sayer is now assistant to Mr. Snow.

* * *

THE offices of the Light Railway Commission have been transferred to 49, Wellington Street, Strand, London, W.C.

* * *

AN interesting booklet dealing with Cab Signalling on the Railophone Instruction system has been issued by International Railophones, Ltd.

* * *

AMONG the many buildings which have been converted into hospitals for wounded soldiers and sailors is the Great Eastern Railway hotel at Harwich.

* * *

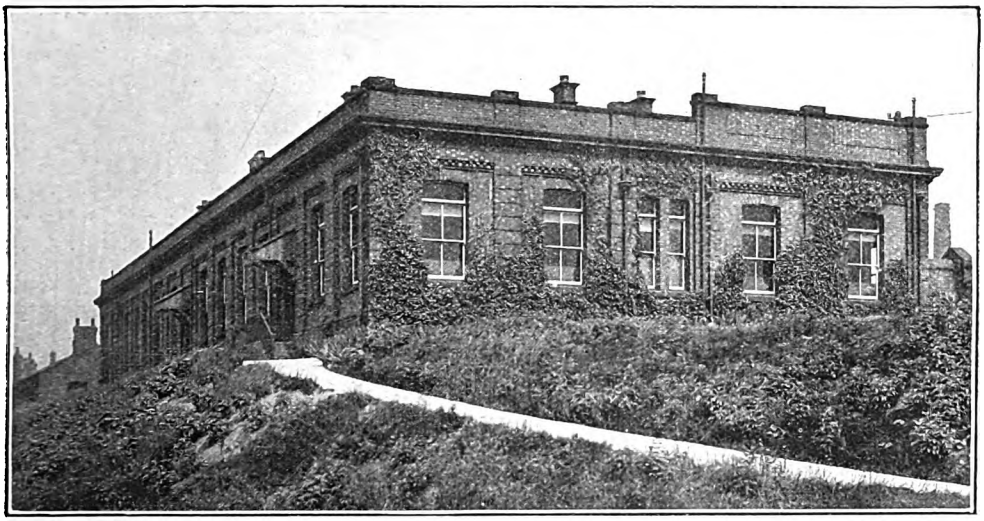
THE grounds of the London and North Western Railway London Athletic Club have been accepted by the War Office for drilling the Foreign Legions Corps camped in the vicinity of Wembley.

Digitized by Google

LIBRARY
OF THE
UNIVERSITY OF ILLINOIS

Digitized by Google

Digitized by Google



CHIEF MECHANICAL ENGINEER'S OFFICES: ADMINISTRATION BLOCK.

Gorton Locomotive Works: Great Central Railway.

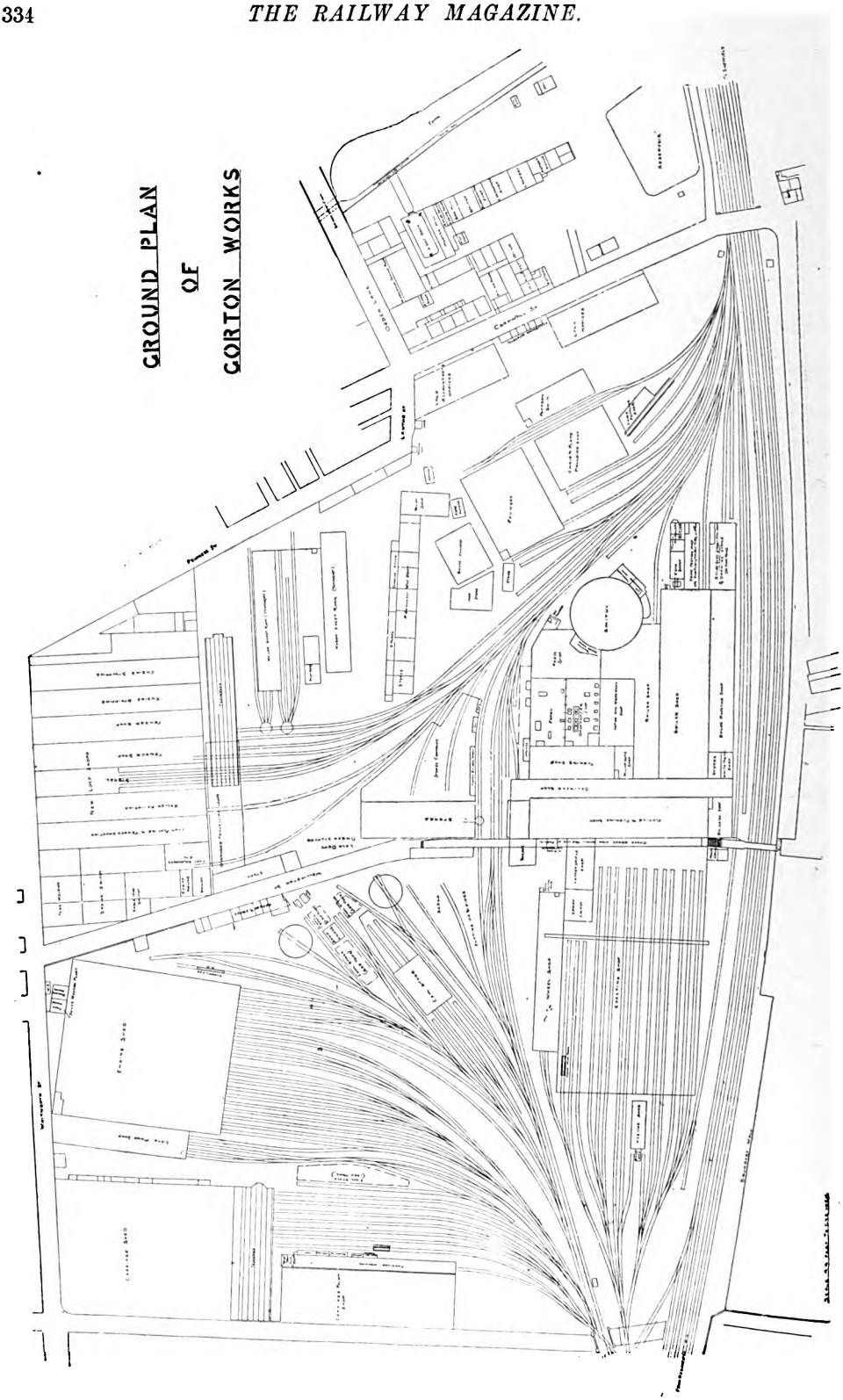
By J. F. GAIRNS.

THE somewhat insalubrious districts of Openshaw and Gorton, about three miles to the east of London Road station, Manchester, on the Great Central main line to Sheffield, can hardly be called railway suburbs, in that various big manufacturing firms, such as Sir W. G. Armstrong, Whitworth & Co., Ltd., and Beyer, Peacock & Co., Ltd., share with the Great Central Railway Company in supplying employment for the thousands of mechanics and workmen housed in the miles of mean streets in the district, or brought to and fro by electric tramcar or by rail. But it is a busy centre in many ways, and ranks as one of the chief engineering areas of "Cottonopolis"; and when the old Manchester, Sheffield and Lincolnshire Railway first selected Gorton* as a site for their works, back in early days, the locality was one offering many advantages in respect of contiguity to the Manchester termini and goods depôts, as well as convenience for the whole of the Manchester, Sheffield and Lincolnshire system of that period. In fact, the works were then entirely outside Manchester, the large township of Ardwick coming between Openshaw and the City, and it is only as a result of more recent development that difficulties have been experienced because of the virtual impossibility of extension and enlargement.

In the RAILWAY MAGAZINE for April, 1902, was published an "Illustrated Interview" with Mr. J. G. Robinson, the well-known Chief Mechanical Engineer of the Great Central Railway. At that time all constructional and heavy repair work was done at Gorton; but since then the carriage and wagon department has been transferred to new and modern premises at Dukinfield, about half a mile beyond Guide Bridge station, so that the original premises are now mainly concerned with locomotive construction and maintenance. That work, however, calls for the employment of some 2,700 men, besides some hundreds attached to the Locomotive Running Shed.

* Although always known as "Gorton Works," the site is actually just outside Gorton and within the boundary of Openshaw. Both Gorton and Openshaw have been incorporated as portions of Manchester for some years.

Digitized by Google



Digitized by Google

Mr. Robinson is responsible for nearly 1,400 locomotive engines, their repair and maintenance, replacement by new ones as required, additions to stock to meet increasing requirements, and control in service. At Dukinfield another 1,500 or so men are employed, with a stock of nearly 3,000 passenger traffic vehicles and about 35,000 goods traffic vehicles to maintain, replace or add to, with control of those in service attached to various depôts; so that, in conjunction with a certain amount of work for other departments as Chief Mechanical Engineer, Mr. Robinson has the direction of many thousands of men, and the oversight of engineering shops which, in the one case, represent the development of old material to meet modern requirements, up-to-date machinery and equipment being more noticeable than one is altogether inclined to expect, and in the other case for works which rank among the best of their class and capacity in the United Kingdom.

The "Gorton Works" cover about 50 acres of land, but this is somewhat mixed up with the engine shed and goods yard area, so that it is in places difficult to say definitely which department is concerned. This area is bounded on the south by the London Road—Guide Bridge main line; on the east by the Peak Forest Canal (belonging to the Great Central Company and which is passed under by the railway just west of Gorton station), and by Cornwall and other streets, according to the system of delimitation adopted; on the north by Whitworth Street; and on the west by the engine sheds and other departments. It can hardly be said that any definite scheme of lay-out is adopted, seeing that the original works have been amplified from time to time by shops added here and there as convenient; but the erecting, boiler and locomotive shops will rank favourably among notable railway premises of their class.

Adjacent to the Peak Forest Canal is a group of small premises, which may be quickly noticed before getting to the works proper. Along the canal bank is a boiler and engine house, pumping house and laundry, etc., with a workmen's dining hall, staff dining hall, and the locomotive running department offices under Mr. W. G. P. Maclure, an assistant of Mr. Robinson's in charge of "locomotives in service" for running duties. Along Cornwall Street, to the north of Mr. Maclure's offices, is a series of enginemen's dormitories for men lodging at Gorton away from home.

Opposite these departments are two ranges of office buildings, with several smaller ones including the telegraph office and local telephone exchange between. Of the two principal buildings one is reserved for the locomotive accountant's staff under Mr. A. H. Geach and Chemical Laboratory under Mr. Harold Gripper, while the other is best described as the "Administration" Block. Here are Mr. Robinson's private rooms and accommodation for his chief clerk, Mr. Thos. Spencer, and the Locomotive and Carriage and Wagon clerical staff. In the same building Mr. W. Williams, Stores Superintendent, also has his offices, under the clerical direction of Mr. Rothwell. Mr. J. W. Smith is Locomotive Works Manager, with offices in one of the works buildings. Mr. R. Thom holds the position of "Assistant to the Chief Mechanical Engineer," and his offices are located in the middle of the works.

The drawing office is located in another building in the works at Gorton, and is in two sections, Mr. W. Rowland being Chief Draughtsman on the locomotive side, and Mr. H. E. Lord (who also ranks as assistant manager of the carriage and wagon works), is in charge of the carriage and wagon side.

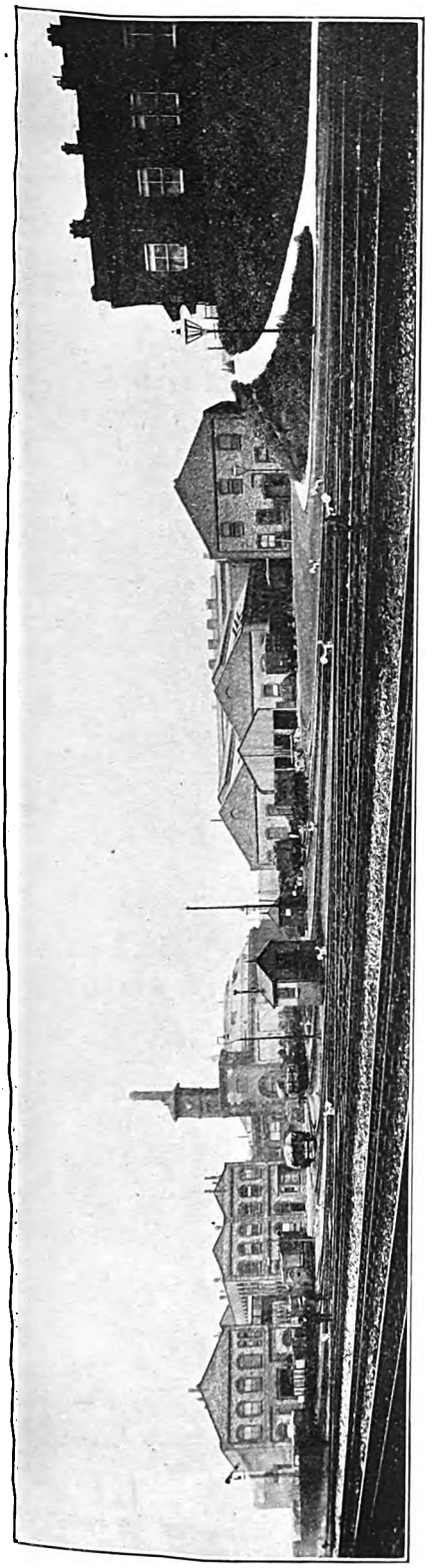
Just beyond the locomotive accountants' department is a workmen's entrance, with lodge and weighing machine for road vans entering by gates adjacent.

The nearest department to the Administration Block is the pattern shop, also utilised for general joinery, including shop repairs, footboards for engines, wood-lagging for boilers (as far as it is still employed), and like work. This is electrically lighted, though high pressure gas lighting is adopted in most of the shops. Machinery installed includes circular and band saws, roller planers, lathes and other tools, all being operated from electric motors driving shafting placed below the floor. Overhead is a pattern store.

In the "Chair Foundry," besides the manufacture of chairs for the permanent way department, such articles as brake blocks, firebars and the like are made, machine and plate moulding being generally employed. A chair fettling shed is placed on one side. The iron foundry proper is in two bays, each served by two overhead cranes, of 6 tons capacity in one and 10 tons capacity in the other. There are four coke-fired cupolas, each of 7 tons capacity (two being generally in service at a time), with a hydraulic lift for coke. The chair foundry is supplied from the same melting plant.

Digitized by Google

Digitized by Google



GENERAL VIEW OF GORTON LOCOMOTIVE WORKS AND YARD, FROM THE MAIN LINE.

At one end of the general foundry is a fettling shop, and there are four core-baking stoves, a core-makers' shop, and a small store for patterns in request, in convenient positions. A sand-grinding and mixing plant is placed in an out-building, with a large sand mill, mixing bins, and a fettling shop for small castings. In the core-makers' shop is a small electric overhead crane controlled from the floor. The charging pits for the core-drying stoves are placed outside the building.

A few yards away is the brass foundry, with three melting pots in one section where locomotive and carriage and wagon brasses are lined with white metal, and a furnace for recovering white metal from old brasses, while in the foundry proper there are seven melting pots, with usual equipment, a Beauman tilting furnace in one corner, grinders for fettling castings, and benches for general fettling. Machine moulding is adopted here to a small extent.

A series of small shops are located near by. One section deals with gas and oil engine repairs, and with locksmith's and smaller general work. Two shops are devoted to machining points and crossings, with large and small rail planers, fixed and radial drills, etc. A large face plate lathe is arranged with a pit adjacent so that base castings for wagon turntables can be machined. In the yard adjacent is a travelling steam crane, and a hydraulic press for bending rails. Another section is used as a fitting shop, while the permanent way smithy has a small steam hammer and bolt making machines. A stores building close by is in two floors, and is connected with the general stores department, except that a section is reserved for works supplies. A receiving office is placed near the entrance gates. The iron store is a separate building.

To the north is the wagon sheet shop, wherein the making and repairing wagon sheets and tarpaulins is carried on; upstairs is a small sewing room where about half-a-dozen girls—the only ones now at Gorton—are employed. A gas engine provides power for their machines. Alongside is the plumbers' and gas-fitters' shop; while the large building just beyond is used for the time being as a sheet store, an important department.

We now come to one of the large buildings in the works. Here were formerly located most of the shops of the carriage and wagon department; until the transfer of the work to the new and commodious shops at

Digitized by Google

MR. R. A. THOM,
Assistant to Chief Mechanical Engineer.

MR. T. SPENCER,
Chief Clerk.

MR. JOHN W. SMITH,
Works Manager.

MR. W. G. PERCY MACLURE,
Locomotive Running Superintendent.

MR. W. ROWLAND,
Chief Locomotive Draughtsman.

Digitized by Google

Dukinfield. In the angular section alongside Princess Street is a 3 in. nut forging machine —one of the largest made—and an oil furnace therefor. Between this section and the main building, on the south side, is an open space against what used to be the Works Manager's offices of the Carriage and Wagon Department.

The main building is in eight bays, utilised in various ways. It is a well lighted section with glazed roof. That to the right is known as No. 0 Bay, and is used for miscellaneous purposes. It is shorter than the others, and at the end is a boiling "bosh" supplied with steam from a locomotive boiler. Nos. 1 and 2 Bays are the engine stripping shops. Here engines are brought in and placed on one of the three lines by means of the electric traverser which serves the whole of this range of shops. Here boilers are removed and placed on trolleys constructed from old tender frames and, by means of a transverser track arranged along the north wall of this range of shops and fitted for capstan haulage, taken to the boiler repair bay or away to the main boiler shop as required. Motion is also dismantled, cleaned in the bosh, and brass work, fittings, rods, pistons, etc., taken down and removed to the machine shop in wagons or on trolleys as required. Wheels similarly go to the wheelshop, and frames to the erecting shop, the principle being that repair work is distributed from here to all departments, the parts re-assembling in due course in the erecting shop. Each of these bays has a 15-ton Royce overhead electric crane.

No. 3 Bay is the tender repair shop, all general repair work, except wheels and axles, being dealt with here. In this bay there are two 12-ton Broadbent overhead cranes. No. 4 is partly used for the same purpose as No. 3, but the tracks only extend for part of its length, the remainder being a machine shop. There are two Fairbairn, Kennedy and Naylor wheel lathes, a duplex Craven drill, shears and punches, and a few other tools, all electrically driven. Further space is used for general plate work. The bay is served by two 15-ton Craven overhead cranes. Beyond the railway tracks in No. 5 is used as a boiler and general plate stores, with an upper floor constituting a store for small work. The remainder is associated with the boiler machine shop in No. 6. This is strictly a tender tank plating and boiler machine shop. It is served by a 12-ton electric overhead Vaughan crane. A

PART OF THE ERECTING SHOP.

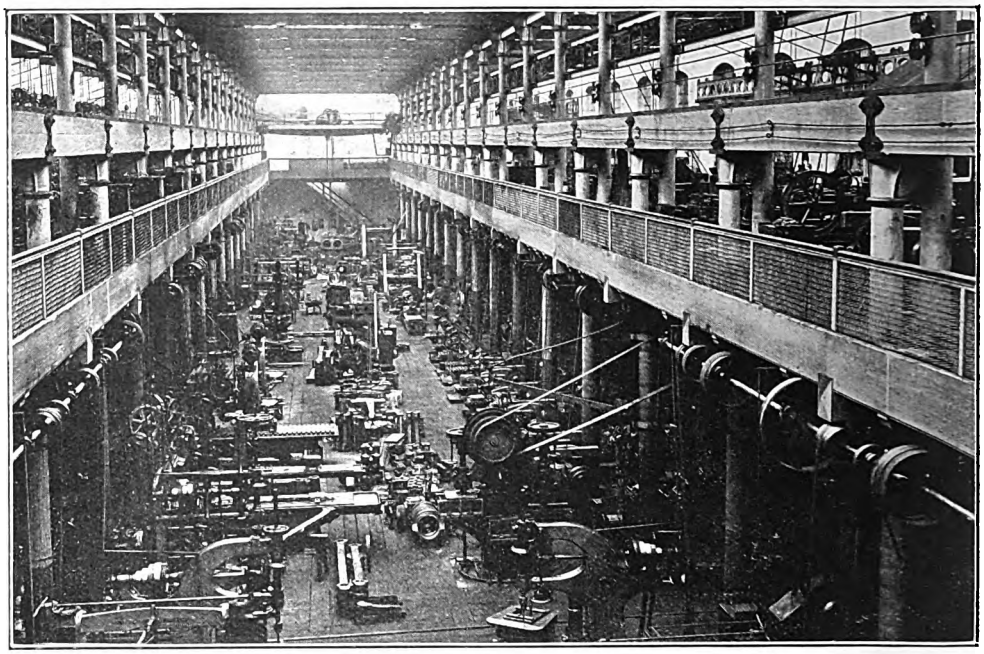
Digitized by Google

wagon road enters the bay at one end, but otherwise machines are mainly accommodated. Among them may be mentioned bar-straightening devices, a high speed motor-driven cold saw, a direct motor driven punch and shear (de Bergue and Co., of Manchester), two small plate edge planers, a vertical milling and sawing machine (Spencer, of Hollinwood), a large boiler and frame plate straightening machine (by Messrs. Rushworth, of Sowerby Bridge), a 20 ft. de Bergue motor-driven plate edge planer, two three-head Asquith high speed radial drills, the centre heads of each machine being back-geared, and various other tools. The line shaft for the group driven machines is operated by an electric motor.

A portion of No. 7 Bay is used for light boiler repairs, the only machine being a radial drill for drilling out rivets from firebox foundation rings. Another section is a boiler mounting shop, for boilers which have remained in this section and have not been sent to the main boiler shops. Here there is a 15-ton Royce overhead crane.

Part of No. 8 Bay constitutes an extension of the light plating shop; another portion is used for marking off plates; while in a further section is a Hartz flue-welding machine and a welding plant for dealing with the large smoke tubes now used for superheater boilers. This is a new machine, of American design, lately introduced to meet new conditions following the general adoption of superheating. One of the small shops alongside contains two-stage Ingersoll-Rand air compressors, and a Roots blower (motor driven), with two Cornish boilers in the adjoining boiler house, for the compressor engines. The blower supplies draught for the angle-iron smithy adjacent.

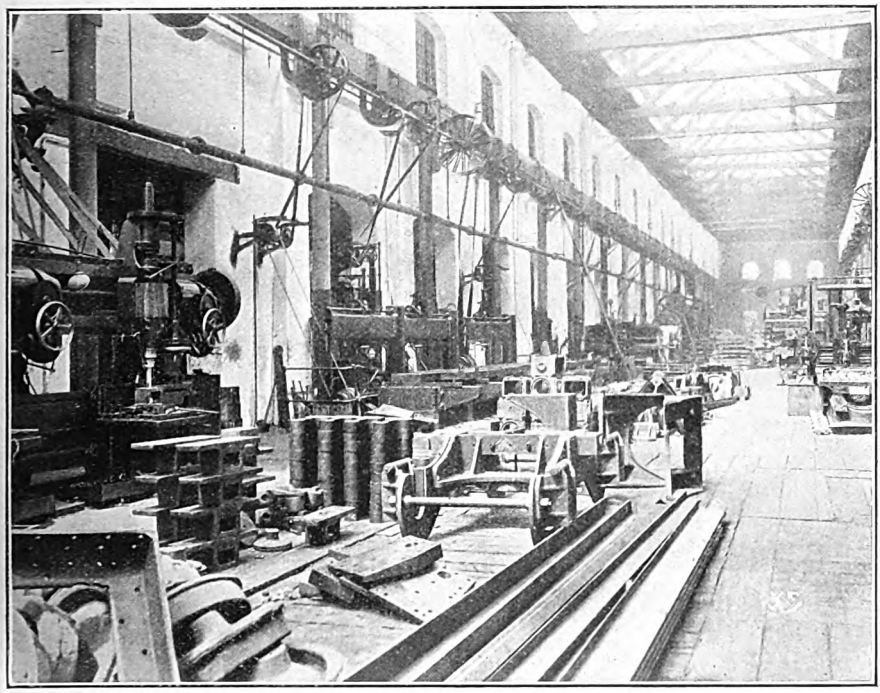
In the latter department there is 1 coal furnace, 1 steam hammer, and 9 smiths' fires, a hydraulic press for bending smokebox fronts cold (by Henry Berry & Co., of Leeds), and a jib crane serving the fires. Dome welding is also done in this shop. In the tube-welding shop, in three bays, there are three rumblers, with room for a fourth, a cutting-up machine for partially defective tubes, the reliable portions being used for welding on to other tubes, devices for thinning the ends and preparing ferrules, a Hartz flue welding machine, and testing appliances. Tubes are placed in racks at the end and tested hydraulically to 500 lbs. per sq. in. before use. Adjacent is a lodge entrance recently built for the use of men employed in this portion of the works.



ONE OF THE MACHINE SHOPS.

Digitized by Google

Returning to the Administration office, the more southerly shops may now be visited. Passing the chair foundry again the two twin buildings adjoining the main boiler shop and alongside the railway first call for attention. The ground floor of the southern of these buildings is used as a boiler shop store and stay shop. Here are stores for various small parts, racks for materials required by "out-stations," a tank for storing in paraffin the pneumatic hammers not in use, equipment for repairing pneumatic tools, a tool room, straightening rolls, boiler shop offices, etc. Above is the smithy and annealing furnace, with oil tanks for dipping chains. Above, a portion of the building is used as the Material Inspector's office, and test laboratory with a 100-ton Greenwood and Batley testing machine, an Avery bending machine for cast-iron tests, and appliances for compression, concussion, torsion and other tests of materials. A third division is used as a brass finishers' shop, with benches, lathes, various tools, and other appliances, a hydraulic lift connecting with the boiler shop. At the end are gauge testing and repairing benches, with a pyrometer testing furnace. Tin-



VIEW IN ANOTHER MACHINE SHOP.

drawing office, under the direction of Messrs. Rowland & Lord as already mentioned. The principal room accommodates the draughtsmen for locomotive as well as carriage and wagon work. There is a photo-printing room, with a platform outside for daylight printing, and in one enclosed compartment a new Halden's continuous photo-printing machine, and also a large fire-proof room for storing drawings.

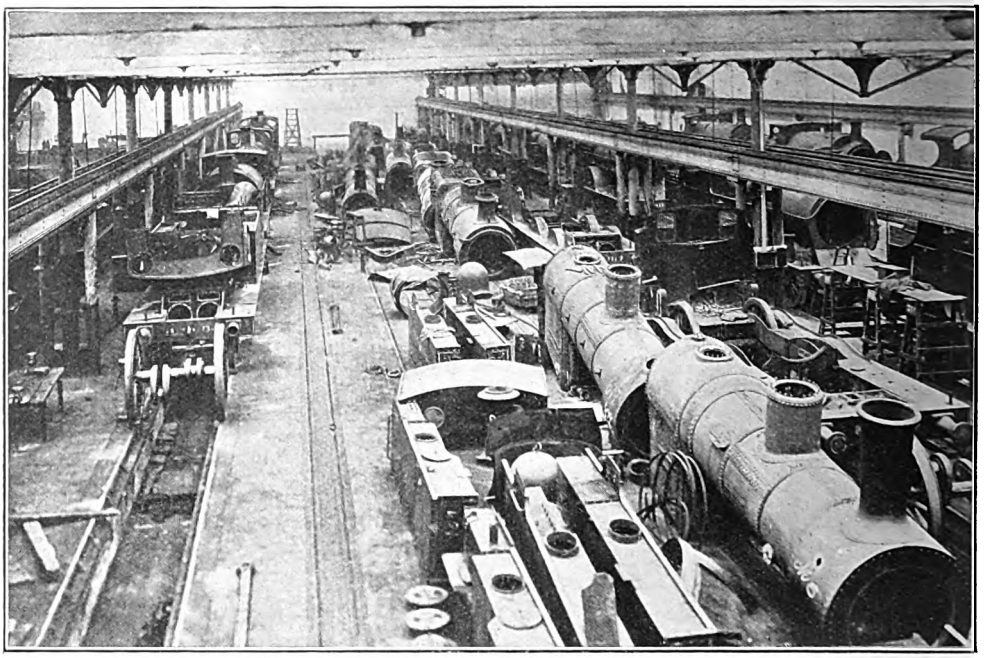
The adjoining building contains on the ground level the chain testing shop, with a 100-ton machine and long enough to take any chain in use. Alongside is a chain plate workers are also employed in this shop.

The boiler shop is in three sections. In the boiler mounting department (300 ft. long and 45 ft. wide) there are two steaming stands at the end, and appliances for testing boilers and for fitting and testing superheaters. Portable machines are employed for machining firebox doors and for facing dome rings, the former being air-operated and the latter rope driven. At the end large boilers which cannot be dealt with elsewhere are restayed or receive minor repairs. In the main shop (350 ft. long and 90 ft. wide)

Digitized by Google

one section is used for fitting girder stays, in the corner are a few millwrights' benches, another division accommodates marking-off tables, while one bay is utilised for machinery, including a big radial drill for throat plates, large and small plate edge planers, a quadruple drill for tube plates, two-head vertical milling and sawing machines for trimming edges of tube plates, a big radial drill cutting out holes in tube plates for large superheater smoke tubes, a big slotter for foundation rings, a multiple drill for wrapper plates, horizontal drills for wrapper and back plates, large and small bending rolls, and punching and shearing machines. In an adjoining section a small amount of frame work is done at one end; at the other are the riveting towers, one with a 20-ton crane and the other with a 15-ton crane. Here is also a hydraulic riveting plant. Air mains are laid throughout these shops for operating portable riveting and caulking and other tools. In the middle is a stay-drilling pit, the machine being operated by rope drive. The remaining space is used for dealing with boilers and fireboxes in various stages. In a side division adjoining the smithy is a copper plate furnace, where copper tube plates are flanged by hand. At the south-west end is a white metal shop for repair work—new work is done in the brass foundry as already mentioned—a grinding shop, with tool room in gallery above it, being adjacent. The store alongside the white metal shop is used mainly for nuts and bolts and the like. At the north-east corner is a millwrights' shop, with benches and a few appliances. In the motion repair shop bench work is chiefly done. There are, however, a few machines, including grinding and tapping tools. These are driven from the boiler shop motors. At the end brake work is done.

The turning shop adjacent to the millwrights' department is concerned mainly with crank work. Here cranks are machined and axles turned, slotted, etc., axle-boxes planed and similar work done. A large tilting-head cross-traversing milling machine may be noted; a horizontal boring machine for bearings, rod guides, etc., a big slotter for crank webs, and various lathes and tools as required. One electric motor drives the machines in the shop.



A BAY IN THE STRIPPING SHOP.

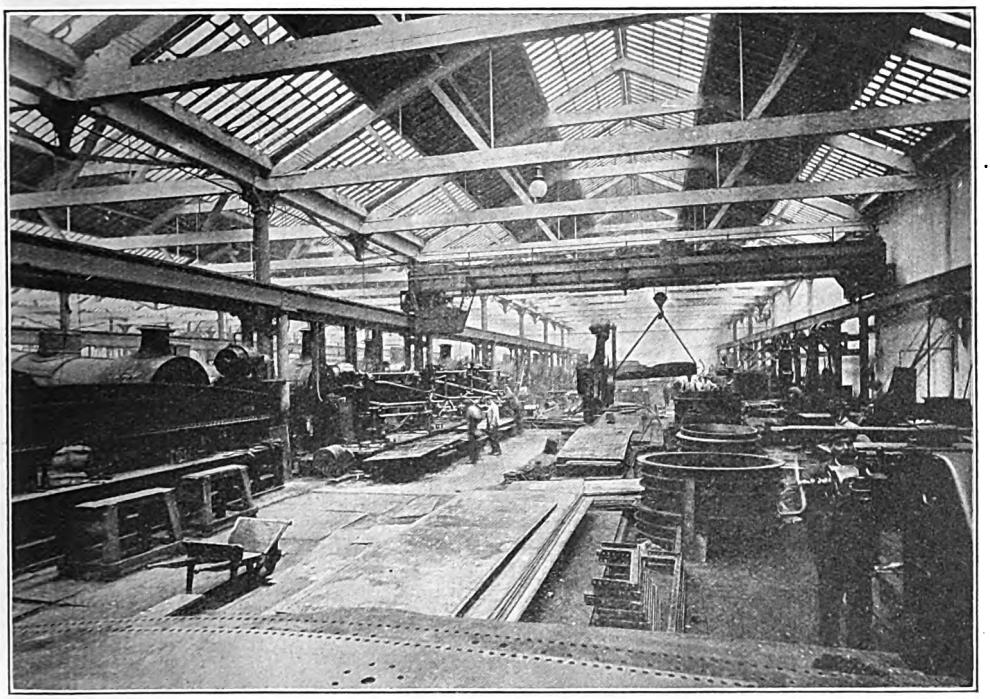
The cylinder shop is a long building 400 ft. long and 35 ft. wide, the machinery being operated by two vertical steam engines. Adjacent to the grinding shop angle iron frame work is prepared, and other miscellaneous work undertaken, including

Digitized by Google

the repair of ticket-dating machines for booking offices. Among the machines here may be noted four large cylinder planers, face-plate lathes for smokebox doors, four twin-cylinder boring mills, two port face vertical planers, a big Kendall & Gent high speed radial drilling and tapping machine, a vertical boring mill for piston rings, a big twin slotter for large cylinders, and a variety of planing, slotting, drilling and other tools. Beyond a cross arcade are drills for cylinders and steam chest covers, two large slotters for motion plates, slotters for cutting keyways in wheel centres, etc. At the end is a large Fairbairn & MacPherson four-head frame-slotting machine, a twin frame-drilling machine with two radial heads, a three-head radial frame-plate drill, a two-head connecting rod boring machine, and other tools. Two motors drive these machines.

The main machine shop has a gallery all round it. On ground level one section is devoted to axle box repairs, with suitable tools. In another division may be noted a big miller, a slide bar and axle box grinder, motion grinding and lapping out machines, a slot drilling machine, connecting and coupling rod boring machines, and various other tools, large and small. In the centre are mainly large planing, slab milling, single or multiple head boring, planing, slotting and other machines, lathes and other tools. In one corner are marking-off benches, while in another section dies for the drop stamps are cut. A few of the machines in this shop are individually driven, but otherwise machines are driven in section groups by four motors.

In the gallery one section deals with spring links, brake hangers and buckles, etc., with suitable tools. In another portion connecting rod bushes and metallic packing are dealt with, new motion work fitted up, regulator heads faced and fitted, and like work undertaken. At the further end on the other side is a tool room with machines for sharpening saws, drills, cutters, etc., with hardening and tempering furnaces and baths. Test pieces for the test room are also prepared here. Further along are stud and bolt machines, and a series of automatic machines, some by Alfred Herbert, others by Messrs. Gridley, and some of Hartness design, by Messrs. Jones & Lamson. A Holroyd screw-milling machine for cutting



A BAY IN THE BOILER MACHINE SHOP.

Digitized by Google

Digitized by Google

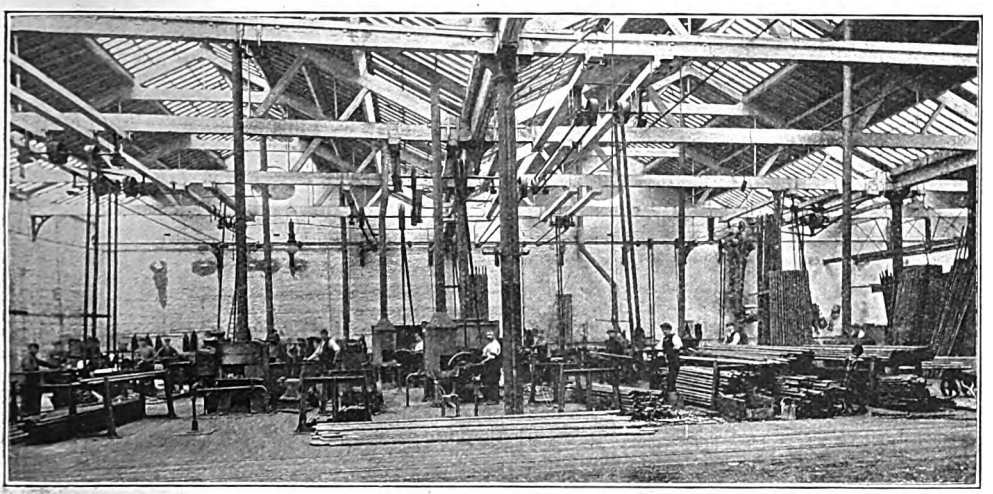
roundhouse adapted, with six Rigby hammers of 7 to 13 cwts. and one arch-type hammer. There are 27 smith's hearths. The blowing engine house adjoins and contains two Roots blowers, electrically operated. The boiler press shop includes a 300-ton hydraulic press by Henry Berry, but this will shortly go to Dukinfield, a 400-ton press replacing it. A double-ended Mason's gas-fired furnace feeds this at one end, the other serving the angle-smiths. There is a big electrically-driven scrapping shears, and the boilers for the steam-hammers are located at one side. A 5-ton hydraulic jib crane serves the press.

In the forge there is one 50-cwt. steam hammer served by two coal furnaces with waste heat boilers, scrapping shears, an Ajax forging machine served by a Ferguson oil furnace, and a 30-cwt. steam hammer served by a gas furnace and a coal furnace.

In the drop hammer shop there is one set of three steam lift Massey stamps and one of two, with oil furnaces serving them. In the corner is a die shop for the drop stamps, and elsewhere are two finning presses, and a small steam hammer and fires.

Except for the various stores buildings also included in the area east of Wellington Street and the bridge which continues it over the works, we have now considered all departments on this side. The bridge mentioned is a curious structure of cage design, for which reason it is sometimes known as the "birdcage," by which the public can pass over the works area. It is closed on one day of the year to show that it is provided by the railway as a convenience to the public and not as a general thoroughfare.

The erecting shop now calls for attention. This is a huge building, 480 ft. long and 250 ft. wide, in five principal sections, divided by a cross road. The western end of the southern bay deals principally with big engines for repair and has two 40-ton rope-driven overhead cranes. The eastern portion is used for erecting new engines of large classes, several representatives of the "Glenalmond" class being in hand on the occasion of my visit. The second, third and fourth bays deal with general work, while the western portion of the fifth bay is used for light boiler repairs for large engines which cannot be conveniently dealt with elsewhere. A large 5-table Pooley weighing machine is installed at the entrance.



TUBE WELDING PLANT.

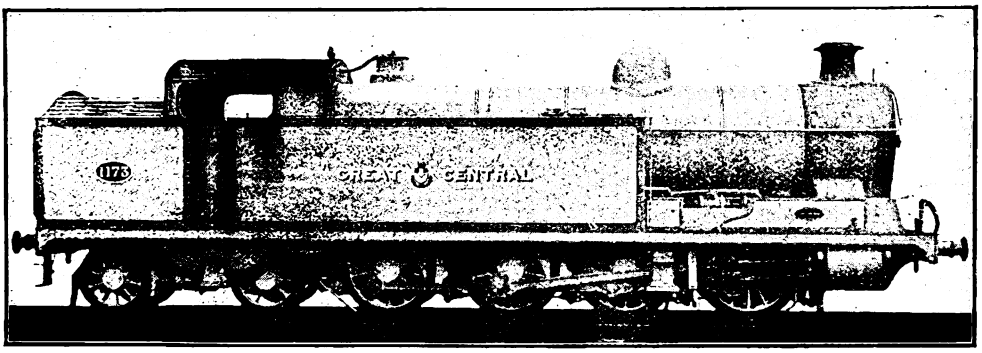
Nos. 2, 3 and 4 bays have each two 30-ton cranes. All cranes are rope-driven, and four wall engines are used for operating them.

On a platform separating the erecting shop from the machine shop, and under the "birdcage" bridge, repair work for brake cylinders, buffers, connecting and coupling rods, and the like is done, with a few small tools. At the end cutting compounds for the tools in the machine shop are prepared. There are also two horizontal air compressors for the pneumatic tools used in the erecting shop.

In continuation of No. 5 bay is the spring

Digitized by Google

Digitized by Google



0–8–4 THREE-CYLINDER SHUNTING TANK ENGINE.
Designed by Mr. J. G. Robinson.

shop (shortly to be transferred elsewhere), with an 8-hole spring furnace, nibbing, shearing and spearing machines, drills, saws and other tools, with a hydraulic spring buckling press. Outside is a scrag and spring stripping machine and a big Buckton spring tester. This bay is completed by the coppersmiths' shop, with six brazing fires, rolls, cutters, etc. Boiler lagging plates, dome covers, and the like are also dealt with here, while steel steam pipes are bent and hydraulically tested to 1,500 lbs. per square inch.

Outside this building is a Selas motor-driven plant for the gas compressors supplying the high-pressure gas lighting system for the shop. Adjacent is a boiler shed with three Lancashire boilers for the machine, coppersmiths' and erecting shop engines.

The wheel-shop is 320 ft. long and 51 ft. wide. There are two 20-ton overhead electric cranes and the shop shafting is driven by wall electric motors, two on each side. At the end is a big hydraulic press for forcing wheel centres on and off axles, with an automatic recording gauge, the rule being that the pressure must reach 10 tons per inch of axle diameter. There are also quartering machines, horizontal tyre drilling machines, besides usual wheel and axle lathes. In the corner is a gas ring for tyres.

Near the cutting-up sidings may be noted a big Berry punch and shares, and a bar cropper, with a white metal recovery furnace. At the time of my visit one of the American goods engines was reaching the last stages of dismemberment in the cutting-up sidings.

The engine sheds are of straight-road type, with 20 tracks and accommodation for 120 engines. At the end is a White hot-water washing-out plant. The paint shop alongside has four roads and can deal with 25 engines. It is steam heated, with paint stores and offices at the end. Beyond is a large carriage shed, served by a steam traverser, and opposite a carriage-washing shed and the carriage paint shop, this work being still done at Gorton. A portion of the carriage shed is used as a lifting shop, where fish vans and other coaching vehicles, except the ordinary passenger stock, are dealt with. There is also a small testing shop for electric lighting dynamos, and accommodation in the carriage shed is also provided for minor brake repairs.

Over the carriage washing and paint shops is a mess room for the staff of this section. A small smithy, carriage stores and other departments may also be noted, together with an entrance lodge for men employed at this end.

The works are well served by railway tracks, 0–6–0 saddle-tank locomotives being generally employed, and there are also narrow gauge trolley tracks in and about the various shops.

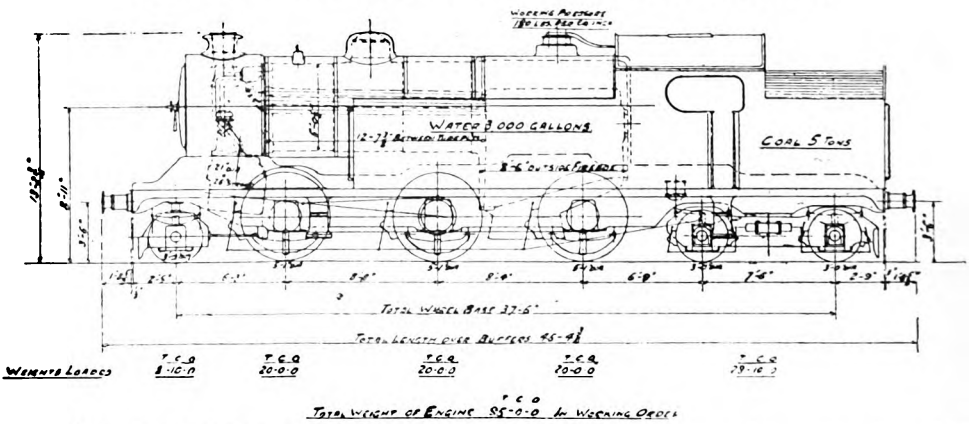
There is a well-authenticated story that a Birmingham school teacher asked his boys where the works of several great railways were located. In the case of the London and North Western, Midland and Great Western lines correct answers were readily given; but when a boy raised a question as to where the works of the Great Central Railway were, the teacher was himself at a loss to answer, and the questioner had to supply the desired information. The sequel is that the matter having come to the knowledge of Mr. T. W. D. Smith, the well-known Publicity Manager of the Great Central, he took up with the teacher concerned, and supplied some illustrations and information which were highly appreciated. In the railway world the Great Central works at Gorton are, of course, well known, and from the foregoing description

Digitized by Google

it will be seen that although not among the very largest in the country, Mr. Robinson has premises under his direction which will compare well with those of other companies. Much of the material is old, and all the difficulties of a site first utilised long ago under vastly different conditions are involved. But in many respects these works are quite up-to-date, much of the machinery is modern, and the works systems and economy of production accord with present-day requirements.

I have to acknowledge the courteous co-operation of Mr. Robinson in the preparation of this article, and the personal assistance of Messrs. Thom & Gamble, the latter of whom is a general assistant in the shops. Mr. J. G. Robinson served his apprenticeship with the Great Western Railway, under the late Mr. Joseph Armstrong, and that Company's late Locomotive Engineer (Mr. Dean) at Swindon. After completing his apprenticeship, he was engaged on the Great Western Railway at Bristol, principally in connection with the Running Department and outside work. In 1884 he resigned his position on the Great Western Railway, upon being appointed Assistant Locomotive Superintendent of the Waterford, Limerick, and Western Railway under the late Mr. Henry Appleby, and in 1888, when that gentleman resigned, he was appointed Chief of the Locomotive, Carriage and Wagon Departments of that railway, which post he vacated in June, 1900, to take up the appointment of Locomotive Engineer of the Great Central Railway. In the spring of 1902, the carriage and wagon department was placed under Mr. Robinson's charge, and his official designation changed to "Chief Mechanical Engineer." Mr. Robinson is a Member of the Institute of Civil Engineers, and also of the Institute of Mechanical Engineers. He was President of the Association of Locomotive Engineers and Carriage and Wagon Superintendents, 1909.

NEW 2-6-4 TANK ENGINE: GREAT CENTRAL RAILWAY.

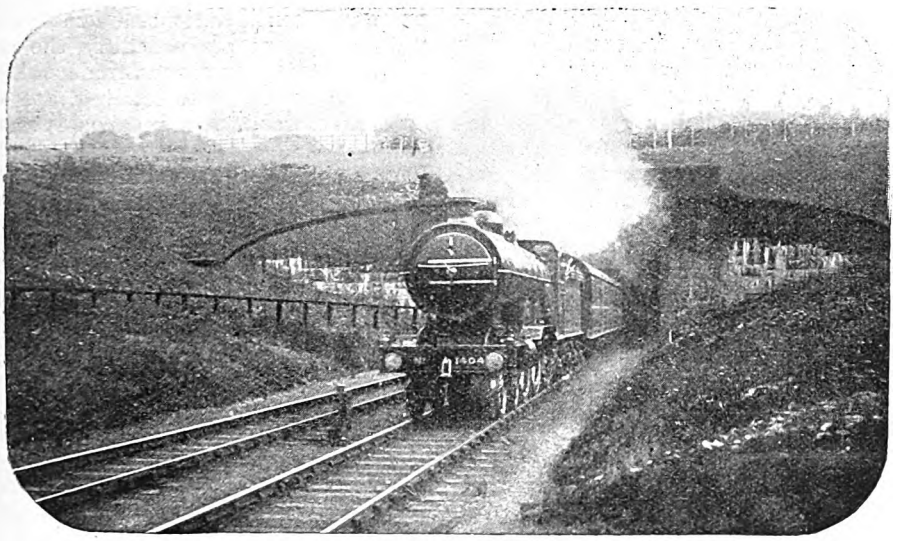


A NEW design of tank engine for goods and mineral service, is now under construction at the Gorton Works of the Great Central Railway. These engines are primarily designed for working the heavy coal traffic between the North Nottingham colliery district and the Company's Docks at Grimsby and Immingham—a distance of about 80 miles. In order to avoid the necessity of incurring terminal delays due to having to turn the engines it was decided to dispense with tenders so as to be able to run them either end first and on account of the length of the return trip to be run in the day, about 160 miles, very large coal and water storage has been provided.

The engines are of the 2–6–4 type with coupled wheels 5 ft. 1 in. diam., and inside cylinders 21 in. diam. by 26 in. stroke, having 10 in. diam. inside admission piston valves driven by link motion and rocking shafts. As far as possible the cylinders and all working parts are made duplicate with those of the "Sir Sam Fay" and "Glenalmond" classes and the boiler is identical with that of the "Director" class. The engines are fitted with water pick-up scoops and have automatic steam brakes acting on all the coupled wheels as well as on those of the trailing bogie. They are also fitted with the necessary ejector and train pipes and train heating apparatus to enable them to work local or excursion passenger traffic if required.

Ample provision is made in the pony truck and bogie to ensure easy passage round curves of as little as five chains radius. The boiler has a maximum outside diameter of 5 ft. 3 in., and the length of the barrel is 12 ft. 3 in., the firebox being 8 ft. 6 in. long outside. It is provided with a "Robinson" superheater of twenty-four elements, 1¾ in. diam., the large tubes containing the elements having an outside diameter of 5¼ in. There are also 157 tubes 1⅞ in. outside diameter. The heating surface of the tubes is 1,390 sq. ft. and of the firebox 157 sq. ft., a total of 1,547 sq. ft., and the superheater has 304 sq. ft. of inside surface. The grate area is 26 sq. ft., and the working pressure 180 lbs. per sq. in.

Digitized by Google



Photo] [*J. G. Irving.*

GREAT NORTHERN RAILWAY.

4 p.m. down Yorkshire Express near Hadley Wood.

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

REFERENCE was made in the October article to the question of locomotive department expenses, and I wish in this issue to touch briefly on this important and far-reaching topic. The subject first arose, it may be remembered, in connection with the working steam pressure of locomotives, and I then hazarded the remark that the high working pressures in vogue on the Great Western Railway must result in boiler maintenance being a costly item in Great Western locomotive expenditure. This led me to attempt some "research" in the published railway accounts for 1913, in order to discover, if possible, which locomotive departments were worked on the most economical lines, and on which systems locomotive expenses were the heaviest. The results of these investigations are embodied in the table given on the following page.

Since the passing of the Railway Companies (Accounts and Returns) Act of 1913, considerably more detail as regards expenditure has been available, and the preparation of accounts on a uniform plan has made it possible to institute comparisons between the practice of various companies. But even then the conditions governing expenditure—conditions which no amount of tabulation could reduce to a common basis—are so innumerable and so varied that it would be impossible to take these figures by themselves as conclusive evidence of either economy or extravagance. Indeed, as point after point bearing on the subject struck me, I began to realise the futility of attempting to comment briefly on a question of such extraordinary complexity. Still, I give the figures for what they are worth, as they have certain features of interest.

In the first column is shown the number of locomotives owned by each railway company operating 100 or more miles of line. The Great Western Railway heads the list with 3,171 locomotives, closely followed by the London and North Western and Midland Railways, with over 3,000 in each case. A substantial drop follows to the North Eastern Railway, with 2,005 engines, and it is then surprising to find as next on the list the Lancashire and Yorkshire Railway, with 1,594. Another unexpected figure is that of the Great Central Railway, which, with 1,356

Digitized by Google

locomotives, beats the Great Northern Railway by 5, and the Great Eastern Railway by 82. In this connection, however, must be remembered the extensive locomotive building undertaken by the Great Central Company in view of the opening of Immingham Dock, more particularly of 2–8–0, or "Consolidation" engines for mineral service. It is curious how closely the totals of the three companies forming the "Triple Entente"—the Great Northern, Great Central and Great Eastern Railways—correspond with each other, but the aggregate of 3,981 locomotives is but little more than half that of the "Alliance" on the other side of the country—the London and North Western, by various considerations. Of these the two most important are probably the cost of labour and the conditions under which the engines are run, as to loading, speed, and grading of road. As regards labour, the extremes are seen in the case of the Great North of Scotland, and the North Eastern Railways respectively. The Inverurie Works of the former company are situated in an agricultural district north of Aberdeen, whereas skilled labour is probably more expensive, generally speaking, on the North-East Coast than in any other part of the country, and particularly as regards engineering. It is possible, also, to hazard other explanations for the very high figure of the

Railway.	No. of Locos.	Locomotive Maintenance.		Locomotive Coal.		Maintenance + Coal.	Train Mileage.		Loco. Cost.
		Total.	Per Loco.	Total.	Per Loco.	Per Loco.	Total.	Per Loco.	Per Mile.
	No.	£	£	£	£	£	No.	No.	d.
Caledonian R.	908	205,667	206	448,727	494	700	16,405,121	18,067	9.3
Furness R.	133	23,381	176	48,869	367	543	1,625,959	12,225	10.7
G. & S.W.R.	524	134,621	257	184,301	352	609	7,758,242	14,806	9.9
G.C.R.	1356	354,457	261	513,646	379	640	19,398,307	14,306	10.8
G.E.R.	1274	366,240	288	484,617	380	668	21,259,215	16,687	9.6
G.N.R.	1351	321,068	238	495,604	367	605	20,164,546	14,926	9.7
G.N.R. (I.)	191	66,874	350	94,846	496	746	3,932,821	20,590	8.7
G.N.S.R.	117	18,942	162	56,280	481	643	2,225,049	19,017	8.1
G.S. & W.R.	317	78,817	249	126,715	400	649	5,973,502	18,844	8.3
G.W.R.	3171	866,362	273	945,907	298	571	51,021,131	16,090	8.5
Highland R.	152	31,177	205	69,516	457	662	2,846,556	18,727	8.7
L. & Y.R.	1594	337,084	212	432,836	272	484	17,589,385	11,035	10.5
L. & N.W.R.	3091	728,846	236	1,160,041	375	611	48,188,588	15,590	9.4
L. & S.W.R.	963	250,157	260	471,530	490	750	18,343,543	19,048	9.4
L.B. & S.C.R.	603	167,870	278	272,276	452	730	13,042,597	21,630	8.1
Midland R.	3019	712,885	236	900,172	298	534	45,490,299	15,068	8.5
M.G.W.R.	139	30,751	221	62,009	446	667	2,481,748	17,854	9.0
N.B.R.	1058	217,479	206	409,865	387	593	17,618,040	16,652	8.5
N.E.R.	2005	676,067	337	641,632	320	657	27,760,095	13,347	11.8
N.S.R.	191	57,738	302	58,605	307	609	2,948,164	15,435	9.5
S.E. & C.R.	727	191,042	263	331,281	456	719	15,059,491	20,715	8.3
T.V.R.	285	54,936	193	49,557	174	367	1,979,864	6,947	12.6

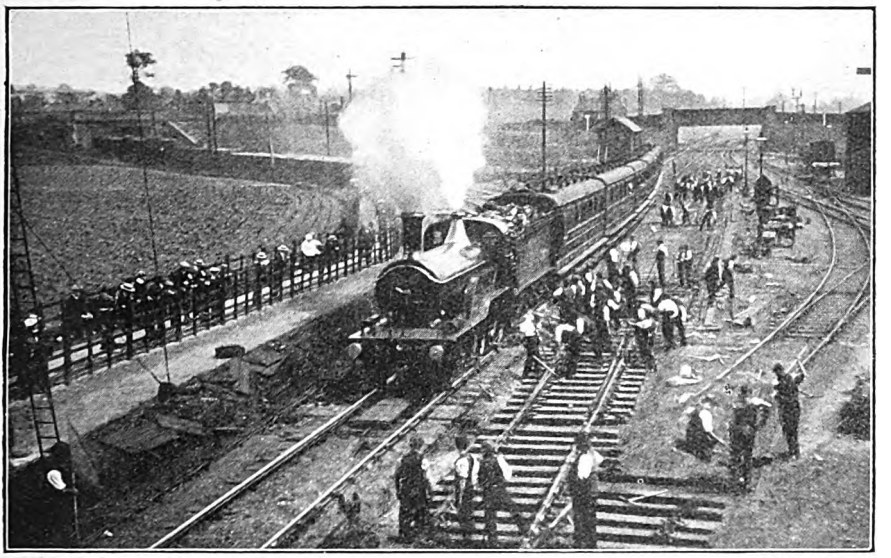
Midland and Lancashire and Yorkshire lines —whose engines reach the enormous total of 7,704. The only other line owning more than 1,000 locomotives is the North British Railway, with 1,058, although the London and South Western total nearly reaches four figures. At the other end of the scale it is really astonishing to find that the Taff Vale Railway owns all but 50 per cent. more engines than the Great Northern Railway of Ireland, the latter company's figure tieing with that of the North Staffordshire Railway.

The second column gives the total official figures for locomotive maintenance for the year 1913, and the third column the cost averaged out per locomotive. This is affected North Eastern Railway. In the first place the average loads, more particularly of mineral trains, are very heavy, 80-wagon trains being frequently run, while the grades on many of the mineral lines are exceedingly severe. In the second place the enormous stock of express engines, including 208 4–4–0 engines (70 of powerful modern types), 52 4–4–2 and 65 4–6–0, is so greatly in excess of main line requirements that it is no unusual thing to see even the latest "Atlantic" engines hauling fast goods trains of the secondary or "B" class, without screw couplings or the continuous brake, for which purpose they could hardly be considered the most suitable type. Thirdly, the strict 8

Digitized by Google

hours' day that the North Eastern Company enforces in the case of enginemen leads to many cases of locomotives being worked with two crews, and it is not reasonable to suppose that, under these circumstances, the men take the same interest in their machines as when locomotive and driver are kept constantly together. These are, of course, expressions of purely personal opinion, but I give them for what they are worth.

Heavy running mileage per locomotive, needless to say, increases the cost of maintenance. This is most marked in the case of the Great Northern Railway of Ireland, which heads the list in the matter of maintenance cost. The same consideration affects the the comparatively moderate mileage run by Great Western locomotives, and the country location of the works of that company at Swindon, the Great Western figure is fairly high—a result in which it is possible that boiler maintenance plays no inconsiderable part. Of the other lines mentioned the North Staffordshire works a heavy and frequent service, both passenger and mineral, over a network of lines with very sharp gradients, including stretches of 1 in 50; all this work is performed by a small "stud" of locomotives of comparatively low tractive capacity, generally speaking, and maintenance costs are correspondingly high.



Photo] [*F. H. Gillford.*

GREAT NORTHERN RAILWAY.

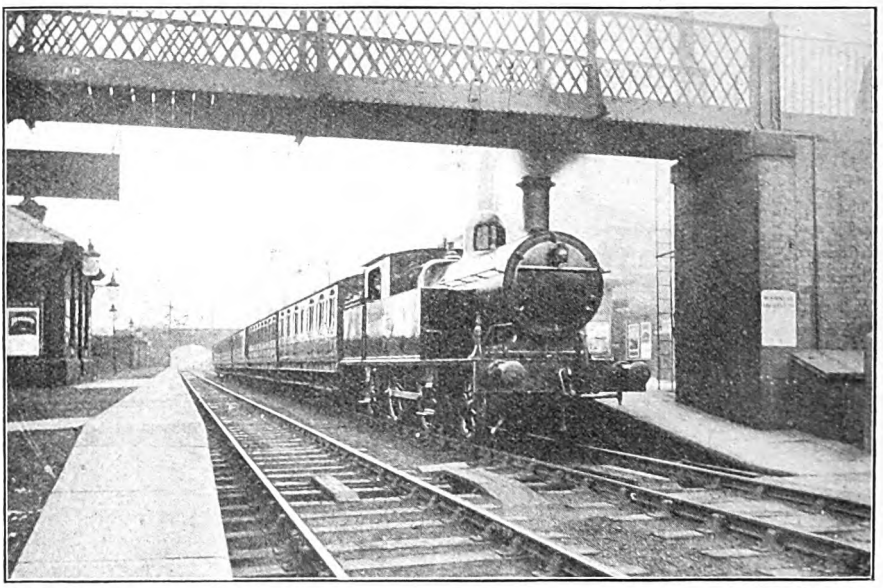
Relaying at Basford (Notts.) A down Derby train is travelling on the up road.

figures of the London, Brighton and South Coast, South Eastern and Chatham, and London and South Western Railways, all of whose engines are apparently kept busily employed during the year, but the situation of the works of these three companies, at Brighton, Ashford and Eastleigh respectively, has a counterbalancing effect, in view of the comparative cheapness of labour. An adverse consideration in the case of the Great Eastern Railway is the location of the works at Stratford, where labour is expensive and rating excessively high; a due proportion of this is doubtless debited to maintenance, and is reflected in the cost of maintenance per locomotive. Considering

In the next columns we have the cost of locomotive coal, first in the aggregate and then per locomotive. These figures, again, are directly affected by the mileage run by the engines, the average loads hauled and the average gradients run over—considerations which it would be quite impossible to reduce to a tabular basis. Other important factors are the quality of the coal used, and the price at which it is delivered to the company in question. The last-named factor operates seriously against lines which have a situation remote from the various British coalfields, and in these cases the carriage of coal from the pit-mouth becomes an important matter. In the latter category may be placed the

Digitized by Google

three Southern lines, the three Irish lines, and the two lines in the North of Scotland, but I must confess to some difficulty in understanding the peculiarly high figure per locomotive of the Caledonian Railway—the only other line whose locomotive coal exceeds in cost £400 per engine. The Great Western Railway, which has its own collieries in South Wales, and uses the best Welsh steam coal, shows off to great advantage, while the Midland Railway, with its comparatively light loading of both passenger and goods trains, has also a light consumption per locomotive. On the Lancashire and Yorkshire Railway, the consumption is still lighter, but this is attributable to the much doubtful honour of first place at £750 per locomotive per annum, but on the London, Brighton and South Coast, and South Eastern and Chatham Railways, as well as the Caledonian Railway and the Great Northern Railway of Ireland, the cost also exceeds £700 per annum. At the other end of the scale we have the Taff Vale Railway, whose total expenditure per locomotive is less than half that of the London and South Western Railway, for reasons already indicated. We have next the Lancashire and Yorkshire and Midland Railways, with expenditures of £484 and £534 per annum per engine respectively, for which, as we have seen, low annual mileage and light



Photo] [*A. Couville.*

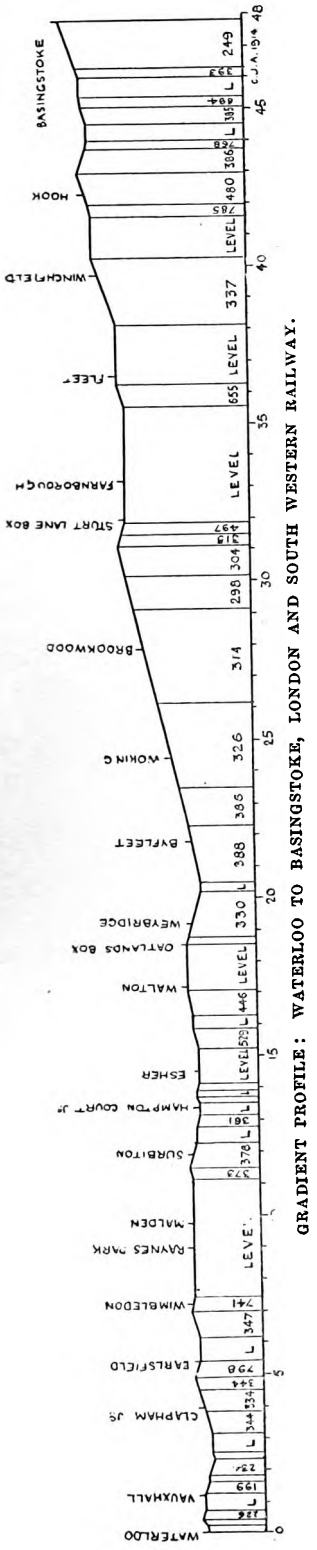
LANCASHIRE AND YORKSHIRE RAILWAY.
Local train worked by 2–4–2 tank engine No. 1532.

smaller mileage run per engine than in the case of most of the other large lines. The Taff Vale Railway figure is, of course, abnormally low, but here the locomotive journeys are all over very short distances, and the locomotive mileage per annum is correspondingly small.

A sum of the two foregoing items—maintenance per locomotive and coal per locomotive—is given in the sixth column, and we thus have presented the rough cost of each engine per annum. Coal being the more weighty factor to take into account, the list is headed by the lines on which coal is the most expensive item. The London and South Western Railway thus enjoys the average loads may be held largely responsible. The figure of £571 only in the case of the Great Western Railway seems a remarkable vindication of Swindon policy. All-the-year-round loading on the Great Western Railway could not, perhaps, be described as excessive, although it is certainly high, but the speed conditions at least are severe, and even allowing for the quality and cheapness of the coal employed the sum expended annually per locomotive is very moderate. The Furness Railway figure is small for much the same reason as that of the Taff Vale Railway.

Finally, in order to roughly apportion the cost to the amount of work performed, it is

Digitized by Google



GRADIENT PROFILE: WATERLOO TO BASINGSTOKE, LONDON AND SOUTH WESTERN RAILWAY.

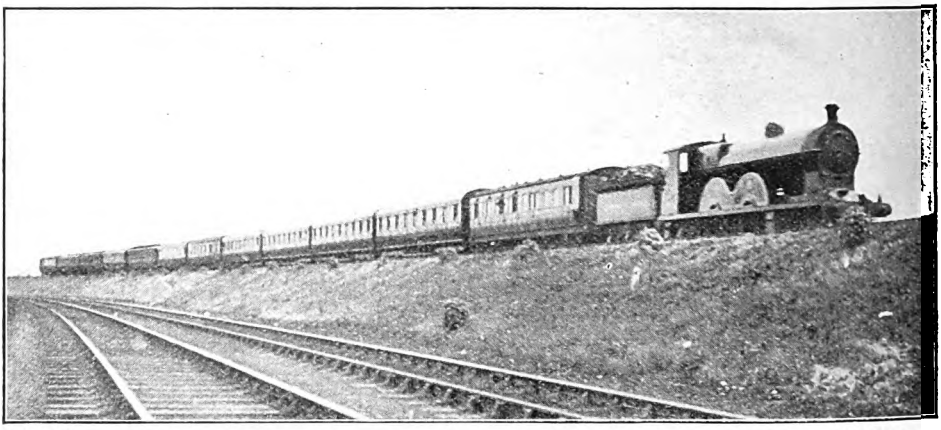
necessary to take into account the train mileage, and these figures are given, both in the aggregate and per locomotive, in the next two columns respectively. The annual mileage achieved by locomotives on the London, Brighton and South Coast, the South Eastern and Chatham and the Great Northern of Ireland Railways is remarkable, in each case exceeding 20,000 miles, and speaks to an exceptional condition of locomotive efficiency, seeing that no account is taken of engines laid off for repairs. In all cases where the coal consumption was found to be high, the train mileage will be found almost correspondingly high, this applying to the Irish, the Scotch, and the Southern lines; so that excessive cost of coal per locomotive is thus additionally accounted for. At the bottom of the list we have the Taff Vale and the Furness Railways, for reasons given already, and also, which is rather more surprising, the Lancashire and Yorkshire and North Eastern Railways, although, of course, many of the mineral train journeys on the latter companies' lines are almost equally short. Opinion, therefore, seems divided as to whether it is the more advisable to secure a high annual locomotive mileage at a correspondingly high maintenance cost, or to reduce the mileage, and the cost with it, and the question seems, from the tables, to be more or less finally decided by the price or accessibility of coal.

An approximate apportionment of cost to mileage is now obtained by dividing annual mileage per locomotive by annual cost of maintenance and coal per locomotive, and the result of this is found in the last column. These figures represent, very roughly, the average locomotive cost per mile run. Pride of place goes to the London, Brighton and South Coast, and Great North of Scotland Railways at 8·1d. per mile, and in the former case this is particularly interesting, as the wisdom of the Brighton company in building locomotives of tractive power substantially in excess of traffic requirements has sometimes been called in question. Average Brighton loads, however, can hardly be described as heavy. Following those companies we have the South Eastern and Chatham, and the Great Southern and Western of Ireland Railways, whose expenditure of 8·3d. per mile is also very creditable. It is very curious indeed to find the Midland and the Great Western Railways tieing for the next place, as it is difficult to imagine two lines whose locomotive and running practice is so dissimilar. The

Digitized by Google

Midland is a line of light loads and engines of comparatively moderate tractive capacity, whereas the Great Western Railway builds large and powerful locomotive types, and still further increases their capabilities by the use of a high working pressure, so that practically any load can be taken unpiloted. At the other end of the scale we find the Furness and Taff Vale Railways, together with the Lancashire and Yorkshire Railways, thus showing that, of the two policies mentioned, that of high mileage and high maintenance cost appears to work out somewhat more economically in the end. But it could not be said that these figures are in themselves in any degree authoritative; they do not take into account loading or grading, or many other considerations of vital importance in gauging ultimate efficiency, and so cannot be regarded as more than affording a very approximate comparison of locomotive expenditure.

I hoped, before writing the present article, to have had an opportunity of recording the work of Mr. Urie's new 4–6–0 locomotives on the London and South Western Railway, but current events have upset all plans. Readers, however, have most opportunely come to my aid with quite a varied selection of London and South Western runs, to which I have pleasure in giving publicity. Before so doing I wish to answer one or two queries from correspondents relative to South Western locomotives, which arose out of references to that company in my article in the 200th issue of February last. One of these letters comes from Great Grimsby and the other from the wilds of Nigeria, and both ask information concerning the various 4–6–0 express types at work on the London and South Western Railway. The latter writer points out, quite correctly, that the first 4-cylinder 4–6–0 engines of the late Mr. D. Drummond's design appeared late in 1905, and therefore preceded Mr. Churchward's 4-cylinder 4–4–2 engine *North Star*, which was built in 1906. Five of the former engines were constructed—Nos. 330–334—and they have each four cylinders 16 in. diameter by 24 in. stroke, with driving wheels 6 ft. diameter. The boiler is immense, having a diameter of 5 ft. 6 in. and a length of 13 ft. 9 in.; the total heating surface is 2,727 sq. ft., and the working pressure 175 lbs. per sq. in. In the autumn of 1907 a further engine of the type—No. 335—was turned out identical in all respects with the preceding series save in the provision of 4 cylinders 16½ in. diameter by 26 in. stroke. The aggregate volume of these cylinders is larger than that of any other engines running in this country. All these six larger 4–6–0 engines on the London and South Western line are now employed on fast goods and heavy coal service, largely between Salisbury and Southampton.



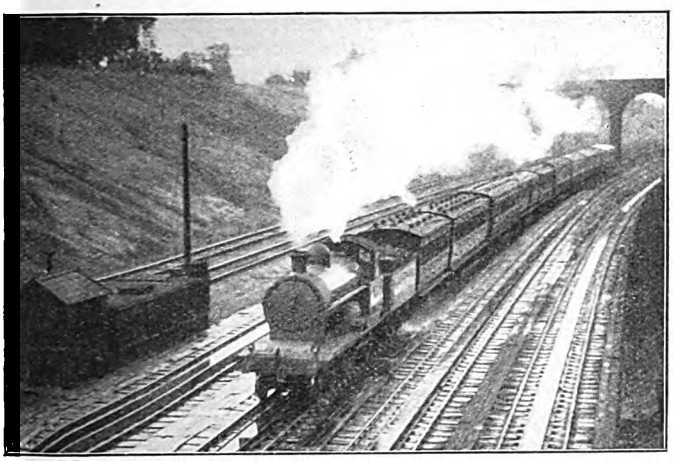
Photo] [*E. Mason.*

LANCASHIRE AND YORKSHIRE RAILWAY.

Manchester–Blackpool express, near Pendlebury.
4–4–2 locomotive No. 702.

The next batch of 4–6–0 engines was the 453–457 series of 1908. In these engines the boiler still has a length of 13 ft. 9 in., but is reduced in diameter from 5 ft. 6 in. to 4 ft. 9½ in., and only yields a total of 1,920 sq. ft. of heating surface; the pressure remains at 175 lbs. per sq. in. The cylinder dimensions are similarly reduced, the four cylinders

Digitized by Google



Photo] [*E. S. Hallett.*

LONDON AND NORTH WESTERN RAILWAY.

Taking water at Bushey troughs.

having a diameter of 15 in. and a stroke of 26 in. The wheels are 6 ft. diameter as previously, and these engines have proved very useful on passenger service over the heavy grades between Salisbury and Exeter. In 1911 a further series of the same type was turned out, numbered from 448 to 452. The same year witnessed the Bournemouth accelerations, and to meet this need a new 4–6–0 type was turned out in that year, of which the first five engines received numbers from 443 to 447, with 6 ft. 7 in. driving wheels. It was necessary to pitch the boiler higher on account of the increased driving wheel diameter, but the boiler of these engines is identical in size with that of the preceding 448–457 series. A further five engines of the last-mentioned type was then built, numbered 458 and 460 to 463 inclusive, and bringing the total number to 10. The working pressure of these engines is 200 lbs. per sq. in., and numbers 447, 458, 460, 461, 462 and 463 are fitted with the Drummond steam-dryer. Up to this date there were 26 4–6–0 engines at work on the London and South Western Railway. To these have now been added the 10 new superheater engines of Mr. Urie's design, numbered from 482 to 491, in which the two-cylinder system of propulsion has been reverted to.

Of the logs sent me, I have first tabulated a series on the fastest booked run of the London and South Western Railway—the 5.3 p.m. from Basingstoke to Vauxhall, which covers the 46½ miles in 49 minutes, average all but 57 miles per hour. Run No. 1 comes from a Highgate correspondent, and Nos. 2–7 from a Clapham friend, the exhaustive detail of whose notes I should much have liked to reproduce, had space permitted. At the latter gentleman's request, I have prepared a profile of the London and South Western line between Waterloo and Basingstoke, which is shown herewith. From this it will be seen that the general tendency of the grades on the up journey is falling throughout, save for short breaks at various points. So the schedule is not a difficult one; indeed, time was kept on every run, although in several instances the maximum speeds in the neighbourhood of Woking were appreciably below those generally attained on the "crack" expresses from Bournemouth and

Photo] [*G. F. Hinson.*

MIDLAND RAILWAY.

We are indebted to Mr. C. T. Billing for this photograph showing the 9.33 a.m. Midland train from Leicester to Peterborough entering Stamford station.

4–4–0 locomotive No. 767.

Digitized by Google

Exeter. The selection of engines is an interesting one. In Run No. 1 the locomotive was No. 702, one of Mr. Drummond's standard 4–4–0 water-tube class of 1899, in No. 2 it was No. 720, the only engine of the 4-cylinder uncoupled 4–2–2–0 class to receive the large boiler, and in No. 3 run No. 471, one of the latest enlarged 4–4–0 type—Mr. Drummond's penultimate design—gave an excellent account of itself. The remaining engines were of the 4-6-0 wheel arrangement, Nos. 443 and 460 being of the 6 ft. 7 in. Drummond type, and No. 486, one of the very latest 6 ft. Urie type, with Robinson superheater.

As usual with this early type, the small engine in Run No. 1 made a remarkably good engine started well, tieing almost exactly with the times of the first run as far as Sturt Lane, and then drawing away from them. Beyond Woking a speed of 72·5 miles per hour was reached, and "even time" was achieved at Weybridge, or nearly six miles earlier than on the preceding run. Approaching Wimbledon, however, a signal check was encountered which once again brought the times level, and a slower finish to the run gave an arrival ¼ min. later. The net time on the latter run, however, did not exceed 47 min., while from Winchfield to Hampton Court Junction it was only 24 min. 34 sec., both speaking well for the capabilities of this unique type.

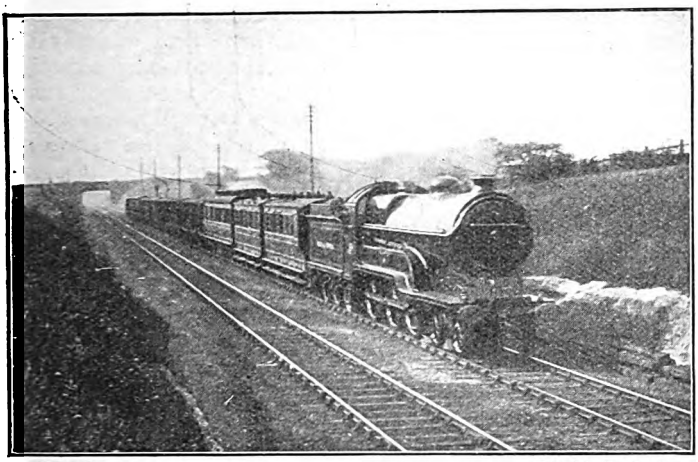
Distance (miles and chains).	Run No.	1	2	3	4	5	6	7	Schedule (min).
	Engine No.	702	720	471	460	443	460	486	
	Type	4–4–0	4-2-2-0	4–4–0	4–6–0	4–6–0	4–6–0	4–6–0	
	Driver	—	Geare	James	Dempsey	Collarbone	Dempsey	Stone	
	Load (empty) tons	200	225	233	215	220	273	245	
	Load (full) tons	210	235	245	225	230	290	260	
—	Basingstoke dep.	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0
5.49	Hook pass	7.23	7.25	7.46	7.47	8.00	8.15	7.30	—
7.71	Winchfield ,,	9.33	9.31	10.06	9.53	10.17	10.31	9.41	—
11.23	Fleet ,,	12.48	12.46	13.07	13.06	13.32	13.45	12.42	—
14.47	Farnborough ,,	15.53	16.01	16.10	16.30	16.37	16.51	15.42	—
15.71	Sturt Lane ,,	17.08	17.15	17.09	17.46	17.52	18.02	16.48	—
19.71	Brookwood ,,	21.08	21.07	20.59	21.50	21.38	21.44	20.21	—
23.38	Woking ,,	24.23	24.17	23.59	25.00	24.46	24.50	23.16	25
26.12	Byfleet ,,	26.45	26.35	26.09	27.34	27.03	27.12	25.23	—
28.57	Weybridge ,,	29.00	28.52	28.20	29.54	29.20	29.39	27.34	—
30.71	Walton ,,	31.03	30.49	30.16 b	32.02	31.22	31.49	29.22	—
34.39	Hampton Court Jc. ,,	34.31	34.05	34.03	35.30	34.45	35.25	32.42	35
35.71	Surbiton ,,	35.48	35.22	35.28	36.50	36.07	36.46	33.58	—
38.5	Malden ,,	38.10	37.34 a	37.43	39.01	38.15	38.56	36.05	—
40.46	Wimbledon ,,	40.45	40.18	40.20	41.28	40.47	41.24	38.29	—
42.22	Earlsfield ,,	42.27	42.24	42.05	43.10	42.30	43.02	40.08	—
43.71	Clapham Junc... ,,	44.08	44.10	43.49	44.46	44.20	44.55	41.52	45
46.42	Vauxhall arr.	47.20	47.35	47.03	48.01	48.14	49.02	45.34	49
46½	Net times (min.)	47½	47	46½	48	48½	49	45½	49

a—Signal check, Wimbledon West Box. b—Signal check, Mole Box, Esher.

showing. The mile-a-minute rate was attained before Hook, which was passed in the fastest time of the whole series of runs, although with the lightest load. At Fleet the speed was 66·6 miles per hour, and beyond Woking the maximum was 70·3 miles per hour, but the slight rise beyond Weybridge brought it down to 62·5. "Even time" was just reached at Hampton Court Junction, and the journey was completed in 47 min. 20 sec., 1⅔ min. under scheduled time. The 26⅝ miles from Winchfield to Hampton Court Junction were covered in 24 min. 58 sec. No. 2 was another good run, more particularly as a strong north-westerly side-wind was blowing at the time. The four-cylinder

No. 3 was a remarkably fine run. Curiously enough, the start was inclined to be sluggish as compared with that on the two preceding runs, but after Winchfield the driver began to show off the paces of his steed. At Fleet the speed had risen to 65·7 miles per hour, and at Sturt Lane the lowest speed recorded was 62·5 miles per hour. From this point forward the rate steadily rose to a maximum of 75 miles per hour at Woking; all previous times had been overhauled at Brookwood and even time was reached just before Byfleet. On the rise to Oatlands the minimum rate touched was 62·7 miles per hour, and speed was again being increased when adverse signals caused a severe slackening at

Digitized by Google



Photo] [*F. H. Gillford.*

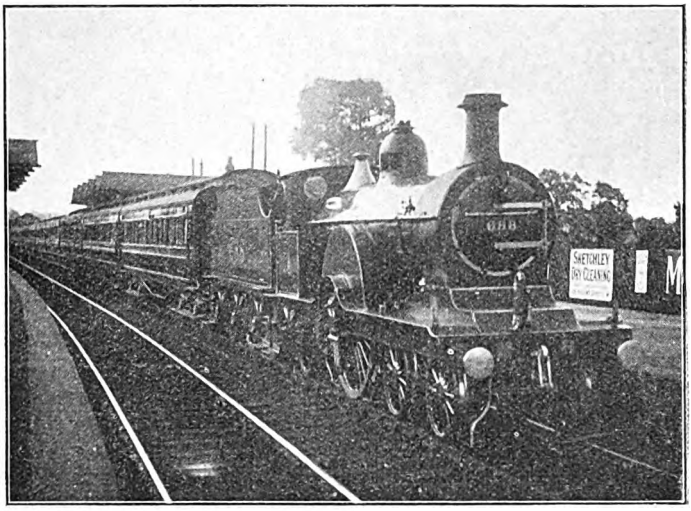
GREAT CENTRAL RAILWAY.

1.13 p.m. Cleethorpes–Nottingham train near Bagthorpe Junction, conveying fish from Grimsby for transfer at Nottingham (Victoria). 4–6–0 locomotive No. 426 *City of Chester.*

Mole Box, just before Esher. This was unfortunate, as the 23 miles from Winchfield to Walton had been covered in 20 min. 10 sec., at an average rate of 68·4 miles per hour with a very fair load. Speed did not again exceed the mile-a-minute rate, and the journey was completed in 47 min. 3 sec., but not more than 46½ min. net for the 46½ miles.

As compared with the preceding runs, the 6 ft. 7 in. 4–6–0 engines and drivers, though keeping time, in no case acquitted themselves brilliantly. On No. 4 run strict time was kept to Woking, and ½ min. lost thence to Hampton Court Junction, although some amends was made in the maintenance of an average speed of exactly 60 miles per hour from mile-post 13 to mile-post 2. As a result of this, 1½ min. were gained between Hampton Court Junction and Vauxhall, the 12 miles 3 chains to the stop being covered smartly in 12 min. 31 sec. A poor start was made on No. 5 run, but after Fleet No. 443 picked up well, maintaining a minimum speed of 62·1 miles per hour at Sturt Lane, and gaining 71 sec. on the time of the preceding run between Fleet and Hampton Court Junction. The sustained speed past Woking was one of 70·6 miles per hour. After Hampton Court Junction the work fell off again, and all but a minute was lost on the times of the preceding run thence to Vauxhall. No. 460 had a really substantial load on the second occasion (run No. 6), but did well on certain sections. The start was inclined to be sluggish, but after Winchfield some excellent running was made, including the excellent minimum speed of 62·1 miles per hour at Sturt Lane with this heavy train. A speed of 70·6 miles per hour was again maintained in the neighbourhood of Woking, but the rate fell to 58·1 miles per hour at Oatlands. Still there would have been a margin on schedule time but for a particularly slow finish from Clapham Junction.

The run with No. 486 completely eclipses every other run in the table, and is a triumph for Mr. Urie's creation. From Basingstoke to Winchfield the start was rapid, although not exceptional, but by the time Fleet was passed all preceding times had been outstripped. Thenceforward the run was a remarkable



Photo] [*W. M. Smith.*

MIDLAND RAILWAY.

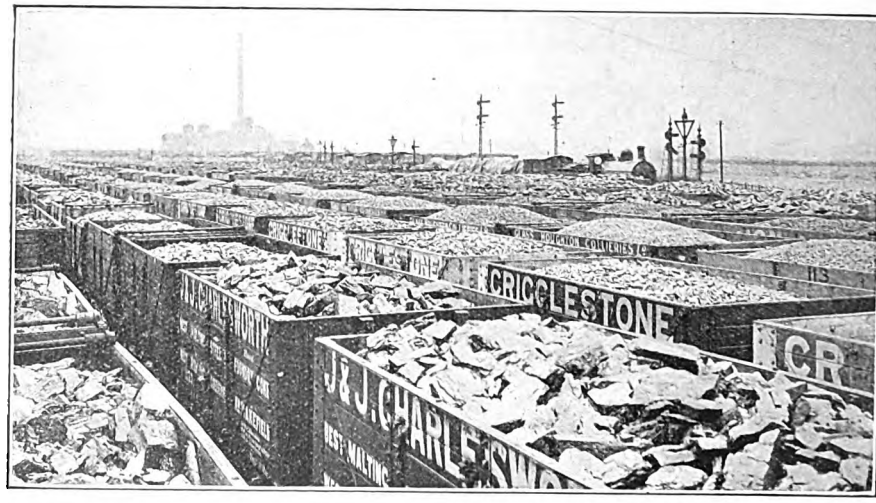
4–2–2 Locomotive No. 688 on stopping main line train.

Digitized by Google

exhibition of speed. At Fleet the maximum rate was 68 miles per hour, while at Sturt Lane the speed did not fall below 65·5 miles per hour. After Pirbright a tremendous rate of acceleration was recorded, the 8 miles between mile-posts 28 and 20 being covered in 6 min. 25 sec. at an average rate of 74·8 miles per hour, with a maximum of no less than 78·3 miles per hour past Woking. As the steepest grade in the whole of this descent is only 1 in 314, this should effectually dispose of the contention that the provision of driving wheels of small diameter is any hindrance to fast running. Even now there was no slackening of effort; the minimum speed at Oatlands was 64·3 miles per hour, and the maximum at Esher 68, while the sustained speed between mile-posts 12 and 5 was 62·1 miles per hour. Time was thus gained on every section, the aggregate gain being nearly 3½ min., and giving a run in less than "even time" from start to stop. With the smart finish from Earlsfield of run No. 4, the time into Vauxhall would have been exactly 45 min. start to stop—an end-to-end average of 62 miles per hour. The time of 32 min. 11 sec. for the 36 miles from Winchfield to Clapham Junction involved an average speed of 67·1 miles per hour, while the average from Winchfield to Walton—23 miles in 19 min. 41 sec.—was exactly 70 miles per hour throughout. "Even time" had actually been reached before Woking was passed. It will be interesting to see whether the Drummond 6 ft. 7 in. 4-6-0 engines can put up any such performance as this after they have been superheater-equipped.

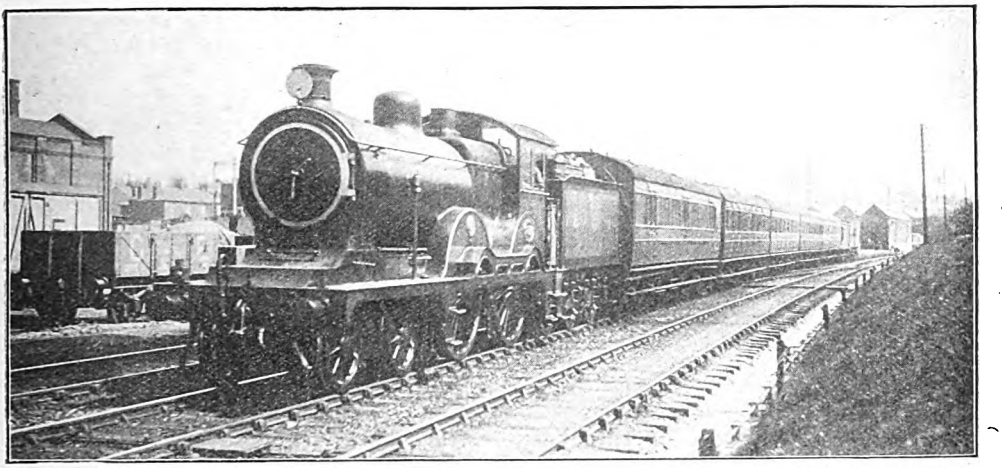
I had hoped to have given details of other runs on the Southern lines, of which correspondents have kindly sent me details, but considerations of space compel me to hold these over until the December issue of the RAILWAY MAGAZINE.

COAL FOR SHIPMENT.



It is necessary to express the annual tonnage of coal dealt with at the various railway ports by millions of tons, but what this means can only be realised when views such as that illustrated above are had. Coal is here shown awaiting shipment at the Goole Docks of the Lancashire and Yorkshire Railway, but at all the great coal shipping ports there are often miles of loaded wagons on the sidings awaiting their turn to go to the coal hoists; yet as a rule every one of them is emptied within a day or two of arrival, their place being taken by fresh supplies.

Digitized by Google



Photo] [*H. T. Worlock.*

GREAT EASTERN RAILWAY.

No. 1822 on Ipswich train, near Brentwood.

A Train Service Metamorphosis.

"RADICAL ALTERATIONS" ON THE GREAT EASTERN RAILWAY.

THE October public time table of the Great Eastern Railway appears in a new cover, a plain blue-grey, in place of the somewhat ambitious and artistic wrapper which has been employed for some time. But the main interest of the new issue is revealed by the intimation that "THESE TIME TABLES INCLUDE MANY RADICAL ALTERATIONS IN THE MAIN AND BRANCH LINE SERVICES." There is also, it is true, the safeguarding statement that "owing to the war, trains are liable to be altered or cancelled without notice"; but that is inevitable under present circumstances.

It is only when carefully examined that the real magnitude of the "radical alterations" can be appreciated. In effect, the changes amount virtually to the complete supersession of the arrangements which have hitherto been in operation for nine months of the year, and their replacement by an entirely new series of trains on both main lines and nearly all the branch lines, the suburban sections, except that of the Cambridge line, alone being relatively unaltered. Many of the trains have, it is true, their substantial equivalents, generally in an appreciably improved form, and it has been necessary to conform to some extent to older arrangements in the case of trains connecting with those of other companies, as, for example, the York services. Also there are many trains adapted to meet specific requirements, and for which the only justification for alteration is that which has been recognised—a later start, with an equivalent or earlier arrival at destination.

Otherwise it is quite correct to describe the new services as a veritable metamorphosis, and the completion of a scheme of entire revision for which there has, if we mistake not, been no correspondent on any line for many years, the nearest approaches being due to such special developments as the opening of new main lines as on the Great Western Railway when the Castle Cary and Bicester routes to the west and north respectively were brought into use.

The new schedules, however, go far beyond any such approximate instances, and may be regarded as a complete overhauling and revision of the main line and branch services throughout the system, with a view to increasing conveniences and facilities, standardising services and introducing a considerable degree of acceleration and speeding up, not only of express trains, but also of secondary, semi-fast, and even stopping trains. The fact that these drastic changes

Digitized by Google

are made at this period is, perhaps, rather unexpected, even to those who were aware that they were being prepared for, and the somewhat unusual procedure of appointing a special committee, of which Mr. H. W. Firth, Electrical Engineer, was chairman, was adopted for the preparation of the new time tables. As a result, it is safe to say that such criticisms of Great Eastern train services as were justified are now, in the main, answered, while great improvements are involved in all ways.

So far only the winter time tables are concerned, and it yet remains to be seen how the arrangements for next summer, including all the special expresses, will be co-ordinated therewith.

A series of articles could be written on this subject, but it is only possible to review the principal features of interest. The general idea appears to be that of devising a complete series of mutually connecting trains, feeding and distributing from one another, so that, besides increasing connecting facilities, long-distance passengers to or from intermediate stations can use an express for the major portion of the journey, incidentally quickening many of the principal journeys by giving intermediate work to collecting or distributing trains. There is, however, a great deal of smartening up generally, and of expediting connecting services for over-all advantage.

First, a few remarks in reference to the important expresses from London. It is on the Cambridge line that the changes are most interesting. From St. Pancras the 12.20, 2.40 and 5.5 p.m. down expresses, together with the 9.15 a.m. connection to Tottenham, and the 5.55 p.m. Hertford train, have gone, the 9.55 p.m. mail connection remaining. Similarly in the up direction only the 8.20 p.m. connection from Tottenham remains. In their place, however, there are two down expresses—10.30 a.m. and 3.55 p.m.—with up expresses due at 1.30 and 7.22 p.m. Moreover, while the 12.20 and 5.5 p.m. were non-stops to Cambridge (the fastest, in fact), all the new trains stop at least once (at Bishops Stortford), and Liverpool Street now has the honour of providing all the best trains.

From Liverpool Street, too, we have new schedules of 70–73 min. for Cambridge non-stop, both up and down, and many of the trains are materially altered and improved, the general effect being later starts, corresponding or earlier arrivals, and speeding up. The conditions involved in the change, principal trains only, and direct from London to Cambridge, may be thus set forth:—

LONDON AND CAMBRIDGE DIRECT SERVICES (FAST TRAINS ONLY).

Down Trains.								Up Trains.							
Old Times.				New Times.				Old Times.				New Times.			
Dep.	Min.	Stops.		Dep.	Min.	Stops.		Dep.	Min.	Stops.		Dep.	Min.	Stops.	
				a 5.13	83	3	—					*c* 8.5	75	1	—
				a 8.33	85	3	—	*c* 8.53	82	1	—				
a 8.40	78	1	Y	*a* 8.52	74	0	Y	*d* 8.53	94	3	—				
a 9.10	97	4	—					*c* 9.38	78	0	RH	*c* 9.5	70	0	RH
b 9.15	92	4	—					*c* 9.45	85	2	—				
				*b*10.30	76	1	—	*d* 9.45	90	3	—				
*a*11.5	76	1	Y	*a*11.20	70	0	Y					*c*10.3	77	1	—
*a*12.0	78	1	RH	*a*12.25	76	1	RH	*c*11.20	84	1	Y	*c*11.15	80	1	Y
*b*12.20	71	0	—									*d*12.5	85	1	—
								d 1.23	79	2	—				
				a 2.30	90	5	—	*c* 1.33	76	0	RL	*c*12.57	78	1	RL
a 2.35	78	1	—	*a* 3.0	71	0	—	*c* 2.45	83	2	Y	*c* 2.30	73	0	Y
b 2.40	81	2	—	*b* 3.55	80	1	—	*d* 2.45	93	3	—				
				a 4.20	85	5	—					*c* 3.48	80	1	—
a 4.30	77	1	Y	*a* 4.50	72	0	Y	*c* 4.42	88	2	—	*c* 4.42	73	0	Y
b 5.5	74	0	—	*a* 5.13	97	8	—	*d* 4.42	89	3	—				
a 5.13	79	1	RH	*a* 5.52	73	1	RH	*c* 4.55	85	2	Y	*c* 4.55	86	3	—
a 6.37	87	4	RN	*a* 7.2	72	0	RN	*c* 6.58	78	1	RH	*d* 6.0	82	2	—
a 8.20	80	1	—	*a* 8.58	77	1	—	*c* 7.5	87	2	RH	*c* 6.58	78	1	RH
b 9.55	107	4	—	*b* 9.55	107	4	—	*d* 7.5	92	3	—				
*a*10.7	95	4	—	*a*10.7	95	4	—	*c* 8.44	78	0	Y	*c* 8.39	74	0	Y
				*a*11.30	86	5	—					*c* 9.44	79	2	—

a From Liverpool Street. *b* From St. Pancras. *c* To Liverpool Street. *d* To St. Pancras.
RH Hunstanton restaurant car train. RN Norwich restaurant car train. Y York train.
RL Lowestoft restaurant car train.

Digitized by Google

Thus with a previous service of two down non-stops (both from St. Pancras) and three up (to Liverpool Street) and a fastest down booking in 71 min. (from St. Pancras) and up of 76 min. (to Liverpool Street), there are now no non-stops from or to St. Pancras, but five down (in 74, 70, 71, 72 and 72 min.) and four up (in 70, 73, 73 and 74 min.) between Cambridge and Liverpool Street.

There is now a down semi-fast at 5.13 a.m., compared with the 5.33 a.m. slow; the 8.40 a.m. York leaves at 8.52 and is relieved by a new 8.33 express; the 11.5 leaves at 11.20; the 12 noon Hunstanton restaurant car express leaves at 12.25 p.m.; the 2.35 p.m. is replaced by a new semi-fast at 2.30 and with the York train proper at 3 p.m.; similarly the 4.30 York express is preceded by a 4.20 semi-fast and itself leaves at 4.50 p.m.; the 5.13 Hunstanton restaurant car express is put back to 5.52 p.m., and with a semi-fast at the old departure time; the 6.37 Norwich restaurant car train leaves at 7.2; the 8.20 becomes 8.58, and after the old last train, the 10.7 p.m. mail, there is now a late 11.30 p.m. semi-fast. As most of the long-distance trains pick up their old times—in some instances they get in advance—further afield the later starts are entirely to the advantage of passengers, and there is a more equable distribution of trains, with an earlier first (fast instead of slow) and a much later last train.

In the up direction the first train from Cambridge is now 7.3 instead of 7.53, while the 8.5 express gets in 20 min. earlier than the 7.53 did. Similarly, instead of the 8.55 p.m. slow as the last up train from Cambridge, and then only useful for through passengers who miss the 8.44 p.m. express, there is now an express at 9.44, getting in at 11.3 p.m. Cambridge has, in fact, no fewer than 14 down and 14 up trains in 86 min. or less.

But besides the through trains there is a remarkable system of "feeding" trains, which, incidentally, give a fine service of outer-suburban and slow main line services, connecting with these trains and also providing for the needs of the growing residential districts along the Cambridge route. Thus on Saturdays the 1.38 to Broxbourne picks up to that station for the 2.6 (which retains its peculiarity of a Waltham Cross "slip") and follows as a slow to Bishops Stortford in advance of the 2.30, thence following for Audley End and Saffron Walden. The 2.6 (1.55 other days) itself picks up for the 2.30, which is, again, a feeder to the 3 p.m. non-stop.

Corresponding arrangements apply at other periods, and the 7.2 p.m. has the peculiarity that each of its slip portions is continued on, from Newport to Audley End and Saffron Walden, and from Bishops Stortford through to Cambridge as a slow. Stations beyond Bishops Stortford are specially favoured by this system of connecting trains, and Stansted, Newport, and Shelford also get the 11.30 p.m. and other semi-fasts.

The up service is similarly arranged, and in the case of the 8.5 a.m. from Cambridge, which makes a novel stop (the only one) at Newport, there is a collecting train from Saffron Walden which follows as an outer-suburban fast, stopping only at Waltham Cross after Sawbridgeworth.

Beyond Cambridge there is a considerable amount of speeding up on a smaller scale. The 11.20 a.m. York train now makes the novel non-stop run from Cambridge to Spalding in 60 min., where it picks up the old time of the 11.5; but Ely (March was previously passed without stop by the 11.5 a.m.) has a train immediately following, so that the journey from London to Ely is actually only 3 min. longer than before. Ely also gets faster services to compensate for this by other trains, and in the up direction has a new non-stop in 87 min. to Liverpool Street, believed to be the first time a regular train has passed Cambridge without calling.

On the Newmarket and Bury section there are important improvements. Previously there were only three fast trains from Cambridge to Newmarket and Bury St. Edmunds, connecting with the 8.40 a.m., 11.5 and 4.30 p.m. trains from London. The second of these reached Newmarket in 1 hr. 48 min., and Bury in 2 hr. 14 min., while the best up train was the 8.33 a.m. from Bury due in Liverpool Street at 10.56. The first every-day down service from London was the 8.40 a.m., and the last the 5.13 p.m. to Bury and the 8.20 p.m. for Newmarket. The last from Bury was the 7.7, from Newmarket 7.47 p.m. Now the 5.13 a.m. is the first down, and the 8.58 p.m. the last, while the 8.52, 10.30 (from St. Pancras), 3, 4.50 and 8.58 trains all have fast connections on the branch, giving times to Bury in 2 hr. 2 min. by the 3 p.m. and from 2–6 min. longer by the other fast trains.

The up service is similarly expedited, with fast facilities from Bury at 7.8, 9.7 (2 hr. 13 min.), 11.12, 1.38 (2 hr. 5 min.), and 5.36

Digitized by Google

(the 5.45 slow reaches London by the same main line train), while the 7.16 p.m. from Bury brings a passenger to Liverpool Street at 9.53 p.m., and from Newmarket there is a later departure at 9.6 p.m., reaching London at 11.3 p.m. From Bury it is, however, possible to reach London *viâ* the Colchester line at 8.12 p.m., due in Liverpool Street at 10.58 p.m., using the York-Harwich Continental train.

Other branches served by the Cambridge route are also very materially benefited. As far as possible older conditions have been taken into account. For instance, in place of trains from Bishops Stortford to Braintree at 8.53, 10.29, 12.52, 3.28 or 3.35, 6.19 and 9.20 (Wednesdays only), the departures are now 9.5, 10.42, 1.15, 3.45, 6.1 and 9.5 (every day), an increase of facilities without serious differences. But in many cases the branch services are radically altered, and given additional trains. This involves in some cases essentially different local times, and from this cause some heart-burnings among travellers in the districts concerned may be expected until they become used and adapt themselves to the new conditions. Thus, between Cambridge and Mildenhall trains left Cambridge at 9.52, 1.50, 4.25 and 7, with trains from Mildenhall at 8.20 or 8.25, 11.57, 3, and 5.35. These are replaced by down trains at 7.5, 10.21, 1.53, 4.45 and 7.33, with up trains at 8.2, 11.32, 3.40, 5.48 and 8.30, giving, however, earlier and later trains and an additional service each way. Also, trains left Ely for St. Ives at 9.25, 2.15, 4.25 (Mondays and Thursdays only) and 7.10, returning at 7.30, 11.35 or 12.50, 3.15 (Mondays and Thursdays only) and 5.18; now the departures from Ely are 9.45, 12.40, 4.40 and 6.43, with reverse services at 7.46, 11.10, 3.25 and 5.20.

This sort of thing is characteristic of the re-arrangements nearly everywhere, involving alterations, earlier or later, and occasionally essentially altered intervals between trains; but with the result that additional services are given and main line and other connections amplified and speeded up.

On the Norwich route from Cambridge the principal feature is the filling up of one or two of the gaps and the running of additional cross-country trains. These and other corresponding features need not be referred to in detail, but short reference to the Hunstanton improvements is necessary before turning to the Colchester route.

According to the normal winter conditions, the 9.10, 12 noon, 2.35, 4.30 and 5.13 trains from Liverpool Street and their St. Pancras associated trains, gave services to Hunstanton, the 4.30 (on Mondays, Fridays and Saturdays only) being the fastest train, in 3 hr. 7 min., and the 12.20 p.m. from St. Pancras (connecting with the 12 noon restaurant car service from Liverpool Street) in 3 hr. 10 min. Up, the 7.45 a.m. took 3 hr. 13 min. to Liverpool Street, and other services took about 3¼ hours or longer. Now the 8.52 down takes 3 hr. 3 min., the 12.25 restaurant car express 3 hr. 19 min., the 3 p.m. 2 hr. 47 min., and the 5.52 restaurant car express 2 hr. 51 min.; while of the up trains the 7.13 a.m. is due at Liverpool Street at 10.15 a.m., the 8.15 a.m. takes 2 hr. 45 min., the 5.5 p.m. (dining car train) 3 hr. 11 min., and others not a great deal longer. Earlier and later and accelerated services are also given systematically.

On the Colchester line there is now a systematic time of 65 min. between Liverpool Street and Colchester down and 62 min. up, and of 84-86 min. between Liverpool Street and Ipswich. The 8.23 and 8.26 a.m. trains are combined as a new 8.30 restaurant car train, while the 10 and 10.24 form a new 10.20, also with restaurant cars. The 11.50 becomes a restaurant car train to Ipswich only, picking up for a new express at 12.30 (restaurant cars to Cromer on Saturdays), with slow portions behind the fast sections in place of the old slow booking of the 11.40 (the Yarmouth portions do not run on Saturdays, and the slow section has restaurant accommodation). Then on Saturdays there is the 1 p.m. Yarmouth train in place of the 12.30 portions on other days, and both fast and slow sections have restaurant cars.

The series of trains after 3 o'clock is also altered. Instead of 3.20, 3.24, 3.25 and 3.32, there are now three trains: 3.10 for Yarmouth, Lowestoft, Norwich and Cromer express, 3.22 semi-fast, and slow for stations beyond Ipswich, and 3.25 for stations to Ipswich. The series of trains in the neighbourhood of 5 o'clock is also materially altered. The 4.55 becomes a Yarmouth restaurant car train, instead of a Cromer express, and provides a considerable acceleration upon the old 5 p.m. The 5.6 Clacton tea car train runs at 5 p.m.; the 5.3 p.m. Southend tea car train is put back to 5.18 p.m.; the Cromer restaurant car express now leaves at 5.23 p.m., but picks up the time lost by a later departure by the time Norwich is reached; and the 5.30 is now a non-stop Clacton train (except Saturdays),

Digitized by Google

giving also a fast service to Harwich by means of the Marks Tey slip. At 6.39 is another fast Clacton train; and at 7.45 there is a new late restaurant car train for Yarmouth and Lowestoft, with an express connection to Norwich on Saturdays. Finally, the new 11.30 p.m. gives a late express service for principal stations to Colchester, for which the 8.54 has hitherto given the last departure, except on Saturdays, when the 12.3 Clacton supper car express (now 12.5) was running. The 11.30 p.m. has since been extended to Ipswich.

In the up direction also there are corresponding improvements, but it is not necessary to review these in detail, and it will be sufficient to set forth the general results as regards principal destinations.

To Norwich there were express or fast trains at 5.5, 8.23* (2 hr. 37 min.), 10, 11.40,* 1.30 (2 hr. 35 min.), 3.20 (2 hr. 37 min.) and 4.55* (2 hr. 57 min.). Now the best service is 5.5, 8.30* (2 hr. 28 min.), 10.20* (2 hr. 45 min.), 12.30* (2 hr. 29 min.), 3.10 (2 hr. 23 min.), 3.22, 5.23* (2 hr. 44 min.), and the Saturday express connection off the new 7.45* express, due at 11.12 at Norwich (Thorpe). Apart from the acceleration in times, giving three trains in less than two-and-a-half hours, the later facilities and increased convenience are worth a great deal. The faster up expresses are now 7.55 (Mondays, 2 hr. 45 min.), 8.53* (2 hr. 23 min.), 11.33 (2 hr. 22 min.), 2.14* (2 hr. 26 min.), and 6.55* (2 hr. 29 min.).

Of the five principal services to Cromer, the 12.30* train takes 3 hr. 18 min. and the 3.10 is due at 6.37 p.m. Returning, the 8.10* a.m. gets up in 3 hr. 6 min., the 1.28* in 3 hr. 12 min., and the 6.10* p.m. in 3 hr. 14 min. The whole of the Cromer service, by either route, has indeed been very considerably improved and developed.

Yarmouth gets a new morning express off the 8.30* a.m. down (2 hr. 54 min.), whereas previously the 8.26 was a slow beyond Ipswich. The 10.20* is 10 min. quicker than the 10.24; while the new 12.30* has a fast connection, except on Saturdays, and even its slow portion arrives between the "Saturdays excepted" and "Saturdays only" times of the old 11.40. The 1* p.m. Saturday express is quickened 12 min., and is remarkable in that it has restaurant cars on both the express and the slow portions north of Ipswich.

The re-arrangement of the series of trains about 3.20 gives an arrival at Yarmouth off the new 3.10 at 6.1, while the new train at 4.55 in place of the 5 p.m. reaches Yarmouth at 8.2 instead of 8.24. This was the last train, but now there is the new 7.45 p.m. express with dining cars to Lowestoft (10.57 p.m.), arriving Yarmouth at 11.5.

The first up train from Yarmouth is now 6.33 a.m. instead of 6.5 a.m., but arrives at 10.18 instead of 10.30, though in both cases all stations north of Ipswich are served, and there is only one stop south thereof, at Witham instead of Colchester. The Witham stop gives good services from Braintree. The 7.33 Monday express starts 4 min. later and gets in 10 min. earlier, while the slow connection with the Cromer breakfast-car train gives a somewhat similar gain. The Yarmouth breakfast-car train starts 12 min. later and arrives 10 min. earlier, while in place of the 10.58 semi-fast there is a new slow to Ipswich at 10 a.m., picking up for an express at 11.5 due in London at 1.55 p.m.

The next train up was the 2.20 semi-fast, except for a Mondays only express at 1.40; now there is an express every day at 1.48, fed by a slow at 12.38, due at Liverpool Street at 4.40 p.m., while the new 2.35 is the 2.20 improved. The 3.30 is an equivalent to the old 3.50, and the 6.10 semi-fast is replaced by a pick-up train at 5.40 and an express at 6.28 (due at 9.24), both sections having restaurant cars. In place of the 6.27 slow to Ipswich, the last train along that section, and then only to Ipswich, the new 6.50, goes right through to London, first as a slow and then as a semi-fast, reaching Liverpool Street at 10.58 p.m. Lowestoft and the other branches benefit in corresponding degree.

To Harwich (Town) only the 8.40 p.m. Continental train gave a run under 2 hours, but now the 10.20, 3.22, 5.30, 7.45 and the 8.40 trains give faster times. In the up direction, the 9 a.m. is due up at 10.55, and the 1.23, 4.32, 5.31 and 8.59 trains improve at least a few minutes on a 2-hour booking.

To Clacton-on-Sea (Frinton and Walton get similar facilities and corresponding times) there were only the 1.30, 3.25, 5.6, 5.30, 6.20, 8.45, and 12.3 (Saturday midnight) in 2 hours or less, and only the 5.6 (1 hr. 43 min.) and 12.3 (1 hr. 41 min.) up which represented any substantial reduction upon the two-hour allowance. Now the 12.30, 1 (Saturdays only), 3.22 p.m., 5, 5.30 (not Saturdays, non-stop to Thorpe-le-Soken), 6.39, 7.45, 8.45 p.m. and the 12.5 Saturday supper-car train all do better than two hours, and the 5.30 in 95 min. only.

* Restaurant cars on these trains.

Digitized by Google

The best up trains were the 7.2 a.m., 7.40, 8.45, 9.59, 2.58 (not Mondays) and 3.30 (Mondays only). Now, the 7.6 a.m., 7.42, 8.21, 9.54, 1.40, 2.47, 3.30 (Mondays only) give times ranging from 96 to 112 min., and several others are not a great deal slower.

On the Southend section, in view of the previous high level of the services, the changes are not great. The 5.12 a.m. was added some time ago, the 6.38 is replaced by a faster 7 a.m., with a 7.56 a.m. regular train in place of the 7.43 seasonal service. The 9.1, 10.3, 10.44 and 12.10 trains are improved versions of older ones, while several of the Saturday afternoon expresses are accelerated by a few minutes, bringing them under the 60 or 65 min. schedule. A new express is put on at 4.48 (except Saturdays), and the 5.3 p.m. tea-car express is put back to 5.18 p.m., and allowed only 57 min. The 5.36 is extended to Southend. The 10.50 (not Saturdays) runs every day as an express at 11 p.m., while the supper-car train leaves at midnight, and is allowed only 62 min. The new Sunday trains recently added are of course now incorporated.

In the up direction there are now expresses as follows: 6.27 (65), 7.19 (60), 7.46 (59), 8.15 (60, breakfast cars), 8.45 (64), 9.20 (55, a new schedule), 9.57 (63), 10.50 (60), 12.10 (not Saturdays, 60), 1.15 (Wednesdays only, 60), 5 (65), 10.20 (70), besides several not much slower. The 9.20 a.m. up train in 55 min. is a novelty, the previous best being 57 min.

The principal features of interest are usefully summarised by the *Railway News* and may be given here:

START TO STOP RUNS (fastest allowances).

D, down trains; U, up trains.

	Old times.	New times.
Liverpool St.—Cambridge ..	71 D*	70 D U
,, Ely	—	87 U
,, Chelmsford ..	40 U	37 U
,, Colchester ..	65 D (slip)	62 U
,, Ipswich	88 D	84 D U
,, Thorpe-le-Soken	—	83 D
,, Prittlewell ..	56 D U	53 U
,, Bishops Stortford	43 D	39 U
,, Newport ..	—	52 U
,, Witham	—	47 U
Newport—Cambridge	—	23 U
Cambridge—Spalding	—	60 D
Witham—Ipswich	—	41 U
Ipswich—Norwich (Thorpe) ..	56 U	55 U
Ipswich—Beccles	53 U	49 D

* From St. Pancras only.

BEST TIMES FOR PRINCIPAL JOURNEYS.

	Old times. hr.	min.	New times. hr.	min.
London—Lincoln	3	27	3	12
,, Ely	1	39	1	27
,, Hunstanton ..	3	7	2	45
,, Newmarket ..	1	48	1	40
,, Bury-St.-Edmunds	2	14	2	2
,, Norwich	2	35	2	22
,, Cromer	3	28	3	6
,, Yarmouth ..	3	4	2	51
,, Lowestoft ..	2	56	2	45
,, Felixstowe ..	2	11	2	8
,, Harwich (Town)	1	37	1	34
,, Clacton-on-Sea	1	41	1	35
,, Southend ..	0	57	0	55

It must be remembered in considering these times that only the winter schedules are under observation, and trains such as the 4.10 p.m. down and the Cromer and Yarmouth special summer expresses are not running at this period.

The improvement of travelling facilities between comparatively small towns is only one of the advantages aimed at. A general improvement in the service has been made all round, especially in that between east and west, Ipswich and Norwich having been placed in much more rapid communication with the Midlands and the North of England. What may be called suburban trains are being supplied for places like Ipswich and Norwich, so that business men there may have better facilities for living outside the towns.

The Sunday trains have not yet been revised, and the suburban service remains at present unaltered, except in so far as modifications have been rendered necessary by the changes in the main-line time tables. These services are still engaging the attention of the committee.

In the suburban area there are alterations to correspond when affected by the main line services, especially on the Cambridge route, but on the Loughton and Ongar, Woolwich, Enfield and Walthamstow routes the changes are usually of a minor character. The discontinuance of the Stratford-Chingford service is, however, worthy of remark. For many years the service of trains between Stratford and Chingford has been one of the curiosities of Great Eastern suburban traffic. Many of these trains, in returning, instead of proceeding direct to Stratford diverged near the engine sheds and travelled round beyond the depôt and the extensive sidings towards Victoria Park, eventually, after a somewhat mysterious journey, coming in at the south end of Stratford station in position for another journey to Chingford.

Digitized by Google

Exceptional Locomotives in British Design and Practice. [No. I.]

By J. FRANCIS.

ON the home railways there is little scope for exceptional locomotive practice, owing to the relatively standard conditions which obtain on virtually all lines, to the dimensional restrictions which prevent enlargement to any exceptional degree, and the almost complete absence of requirements which have produced so many of the special locomotives used abroad. Yet the railways of the United Kingdom can produce a considerable number of engines which are by no means standard or which do not conform to usual methods, while the wider field of locomotive design and construction for use abroad, either in our own colonies and dependencies or in South America and other countries where British influence prevails more or less extensively, provides opportunities and requirements which have produced many locomotives which are fully entitled to be described as "exceptional," and which will compare favourably, and often on equal terms, with the more remarkable engines which are frequently cited as representing the advanced practice and methods of locomotive engineers of other nations.

In view of the fact that virtually every design including features of interest on the home railways has been illustrated and described in these pages, there is no need to traverse familiar ground by dealing with the more or less exceptional locomotives in use on the railways of the United Kingdom; but it will be of interest to review the principal items which could be dilated upon in this connection, especially as the list is far more comprehensive than is usually realised.

Taking, for instance, the matter of unique wheel types, it is possible to refer to the famous Great Western engine, *The Great Bear* (4-6-2); the 2-8-0 tank engines on the same line; the 4-6-4 express tank engine No. 325, *Charles C. Macrae*, on the London, Brighton and South Coast Railway and the corresponding engines on the Midland Railway; the 0-8-4 three-cylinder shunting tank engines on the Great Central Railway; the corresponding 4-8-0 three-cylinder tank engines on the North Eastern Railway; the 4-8-4 narrow gauge engines on the Londonderry and Lough Swilly Railway; the 2-6-4 tank engines on that line and on the County Donegal joint system, together with the 4-6-4 tank and 4-8-0 tender engines on the same railways; the Fairlie locomotives on the Festiniog Railway; and the 2-2-0 and 0-4-0 "motor" engines on the London and South Western Railway. To these will be added the 4-8-0 tank engine (of which a line diagram was given last month) now under construction for the Great Southern and Western Railway of Ireland; while Mr. James Holden's 0-10-0 three-cylinder tank engine tried some years ago on the Great Eastern Railway also requires mention, though No. 20 herself is no longer in existence, even in modified form. Mr. Robinson's 2-6-4 tank engine design for the Great Central Railway, referred to on another page is also of interest.

One could also refer to engines which are unique on particular railways, or in England, Scotland, Ireland or Wales, as the case may be; while in respect of features of practice there are many classes which are distinguished as being the only ones including a certain characteristic, either as regards British railways as a whole or on their own railway. There is no need, however, to labour this matter, except that the list given above provides a good starting point for a comprehensive record indicating that it is not necessary to go abroad to find a goodly selection of more or less exceptional locomotives in service.

It is, however, in connection with locomotive building for use in our colonies and dependencies and in countries where British influence and practice prevails, that most material of present interest is provided, as will be seen from the selection of locomotives illustrated herewith. At this stage the writer

Digitized by Google

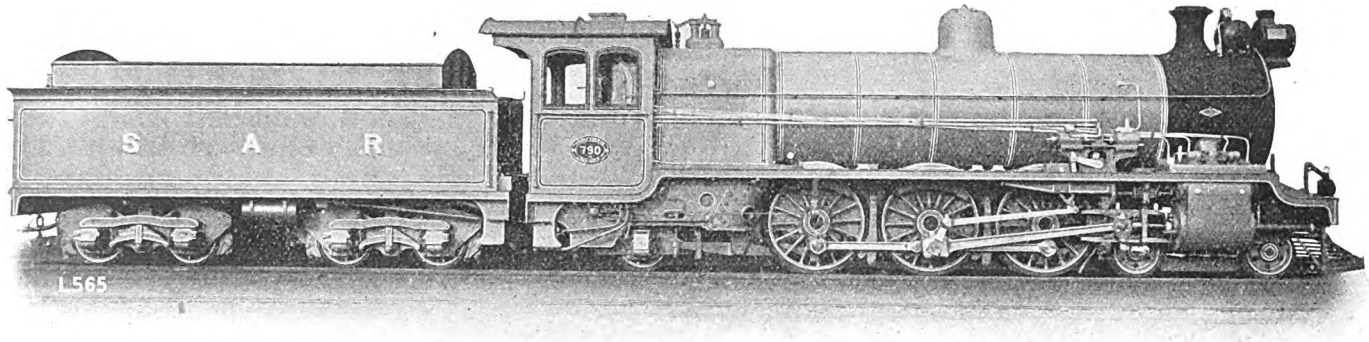


FIG. 1.—4–6–2 LOCOMOTIVE: SOUTH AFRICAN GOVERNMENT RAILWAYS (3 FT. 6 IN. GAUGE).
Built by the North British Locomotive Co., Ltd.

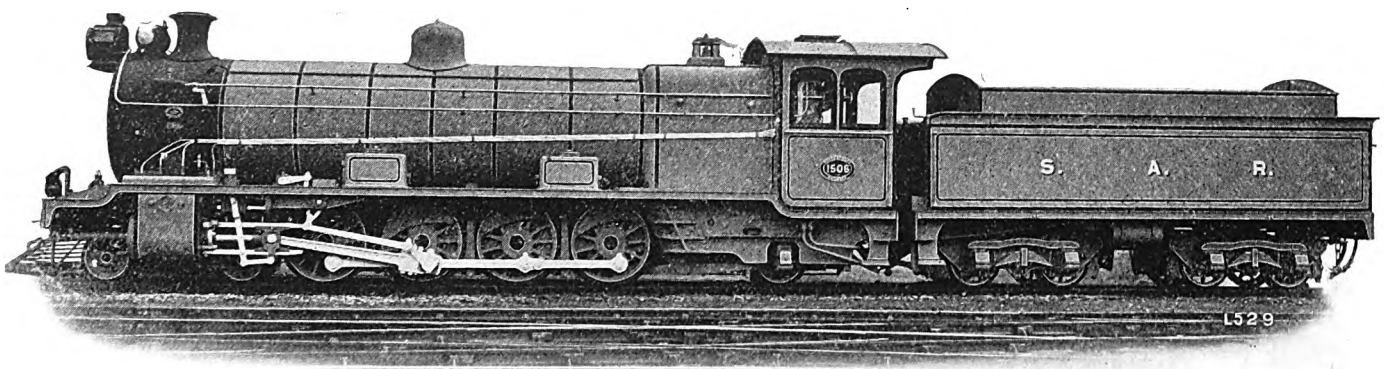


FIG. 2.—4–8–2 LOCOMOTIVE: SOUTH AFRICAN GOVERNMENT RAILWAYS (3 FT. 6 IN. GAUGE).
Built by the North British Locomotive Co., Ltd.

Digitized by Google

may acknowledge the courteous co-operation and assistance rendered by the North British Locomotive Co., Ltd.—the largest firm of locomotive builders in Europe—Messrs. Beyer, Peacock & Co., Ltd., of Gorton Foundry, Manchester, the Vulcan Foundry, of Newton-le-Willows, Messrs. Kerr, Stuart & Co., Ltd., Messrs. Robert Stephenson & Co., Ltd., and others whose work now receives attention.

In many cases the reason why it is possible to develop to a degree beyond what is required or practicable on our own railways is that greater freedom of loading gauge exists, but as a rule the problem is mainly that of meeting special demands, or operating in specific circumstances, or of hauling very heavy trains over more or less difficult roads for which no comparison exists on the home lines. Frequently speed is a secondary factor, except in a relative sense, and hauling power or ability to work trains as required is the governing element. In many cases the demands are, indeed, of an extreme character, and for that reason our locomotive designers in the employ of consulting engineers in London, who are largely concerned in the provision of locomotives such as those to be referred to, and the technical staffs of the leading locomotive building firms, are required to proceed on special lines, frequently on the basis of special experience, in order to produce machines which will satisfy the conditions existing in each case. A peculiarity of the locomotive building industry as regards engines built for use abroad is the fact that in many cases the designs are prepared and the locomotives built under the oversight of firms of consulting engineers in London. It must be recognised, however, that these gentlemen necessarily work in conjunction with the engineers actually in charge of the engines in service, and most of the staff in London have had experience specially fitting them for this work. In a few cases the actual designing is done by the locomotive engineers of the railways concerned, consulting and inspecting engineers in England constituting their representatives while the engines are under construction; this fact does not, however, alter the situation in that most of the locomotive engineers responsible for engines to be considered are British by nationality and by training.

Locomotive practice may be exceptional in many ways. In fact, in many instances what is considered exceptional to the general observer, or the ordinary student of locomotive matters, is reckoned as quite orthodox by the practical locomotive engineer; and *vice versa*. Thus a new wheel arrangement may be merely a straightforward development of previous practice; while oftentimes the production of an apparently ordinary design may involve many special features of construction or constitute a difficult task for the designer owing to particular considerations which have to be taken into account.

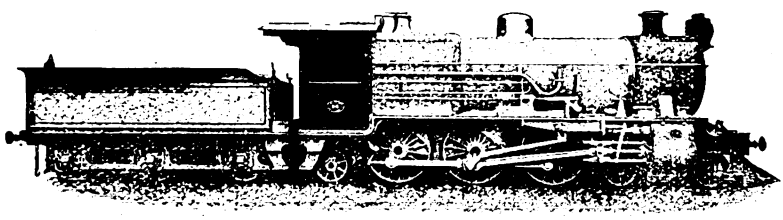


FIG. 3.—4–6–2 LOCOMOTIVE: SAN PAULO RAILWAY (5 FT. 3 IN. GAUGE).
Built by the North British Locomotive Co., Ltd.

It is not, however, necessary to deal in highly technical detail with matters of this class; and it will be sufficient to state that the engines which will now receive attention are selected because they include some characteristic which appears to render them worthy of description as "exceptional" from the point of view of general interest, and in order to set forth the developments which are called for in meeting the requirements of the railways of Greater Britain and of countries where British practice and influence prevails.

A considerable number of the special designs under review are of articulated classes, but it will be most convenient to deal with them in a second article, devoting attention in the remaining space at disposal mainly to interesting engines of other classes.

Digitized by Google

Probably the South African Government Railways provide the hardest requirements to be found on any railway using less than the standard gauge. Here, on 3 ft. 6 in. lines, has to be conveyed an enormous traffic under conditions which appear to be well-nigh prohibitive; and yet the fact that nearly the whole mileage is single-track requires that considerable loads shall be taken by every engine working on the main line, notwithstanding the general prevalence of banks of 1 in 30, 40, 50 and 60, and sharp curves in almost endless sequence. For that reason it became impossible, long ago, to deal with traffic by means of ordinary engines, and it became necessary to develop dimensions to an exceptional degree in proportion to the gauge—one may almost say regardless of the narrow gauge—so that we find on these lines a series of main line engines of great size and power, and of types which are by no means usual. Until a few years ago most of the main line traffic in Natal was operated by the Reid 4–10–2 tank engines, with 4–8–2 engines for lighter work; and in other sections of the Union the engines were of more or less exceptional classes. In later years, however, especially

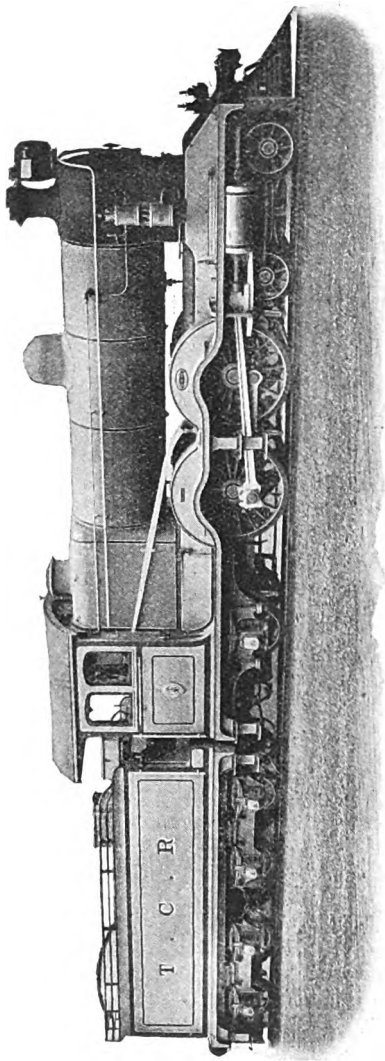


FIG. 4.—4–4–2 LOCOMOTIVE: CHINESE GOVERNMENT RAILWAYS.
Built by Messrs. Kerr, Stuart & Co., Ltd.

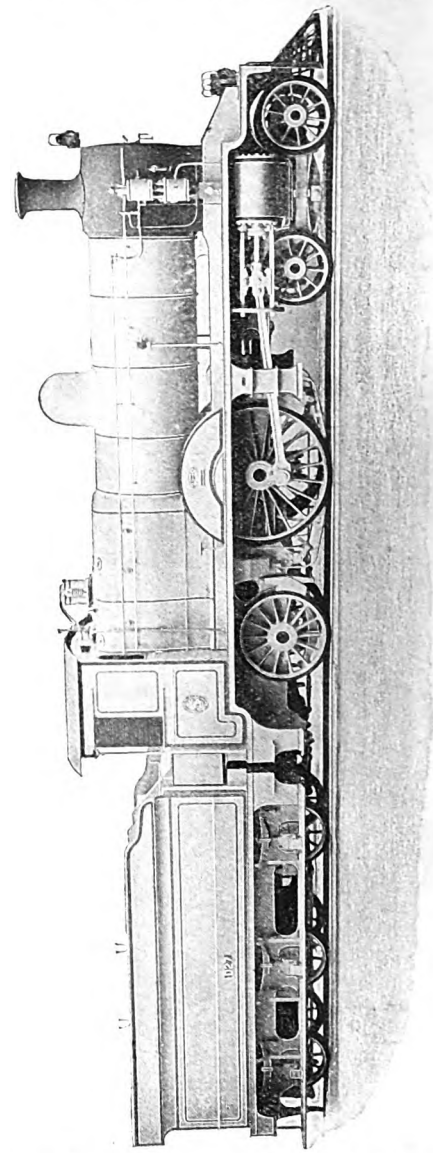


FIG. 5.—SINGLE-DRIVER LOCOMOTIVE: SHANGHAI-NANKING RAILWAY.
Built by Messrs. Kerr, Stuart & Co., Ltd.

Digitized by Google

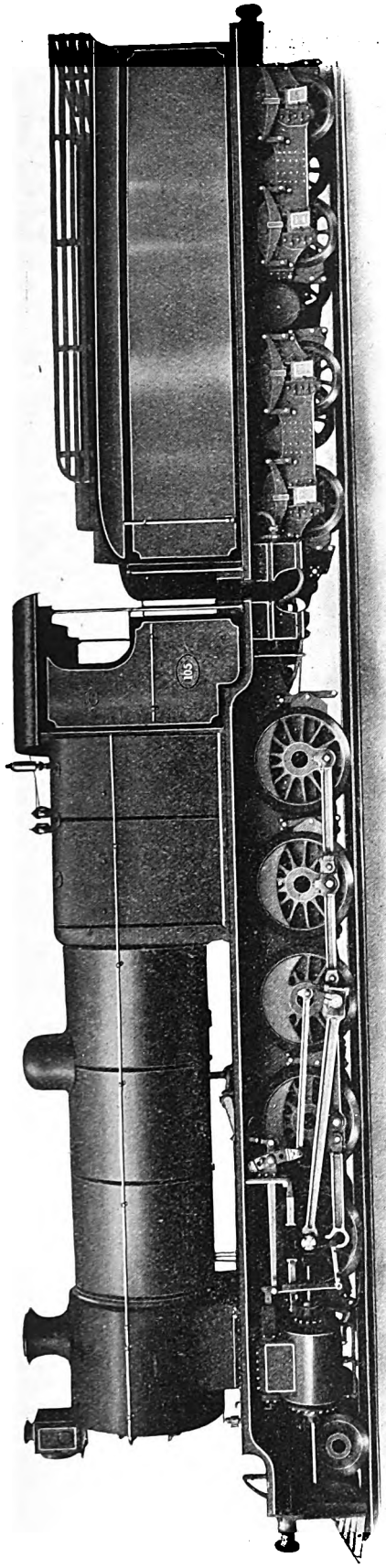


FIG. 6.—2–10–0 LOCOMOTIVE: ARGENTINE GREAT WESTERN RAILWAY (5 FT. 6 IN. GAUGE). Built by Messrs. Robert Stephenson & Co., Ltd.

under the Beatty and Hendrie *régimes*, the general practice has settled down to 4–6–0, 4–6–2, 4–8–0 and 4–8–2 tender engines, with Mallets for special duties, but all with very large boilers and of dimensions which will compare with the most advanced standard gauge practice elsewhere.

Fig. 1 illustrates one of the Hendrie 4–6–2 engines used for passenger traffic where the gradients are not too severe, and principally in Cape Colony. This is representative of the latest class in service, fitted with Schmidt superheater. It was built by the North British Locomotive Co., Ltd. Cylinders are 22 in. by 26 in.; coupled wheels, 5 ft. diam.; bogie wheels, 2 ft. 6 in. diam.; trailing wheels, 2 ft. 9 in.; rigid wheelbase, 10 ft. 9 in.; total engine wheelbase, 29 ft. 5½ in. The boiler has a large Belpaire firebox, and provides 2,177 sq. ft. of heating surface, of which 2,032 sq. ft. is supplied by the tubes and 145 sq. ft. by the firebox. The Schmidt superheater has a surface of 605 sq. ft. Grate area is no less than 36 sq. ft. Steam pressure is 180 lbs. per sq. in. The engine itself weighs no less than 83 tons 14 cwt., of which 53 tons 18½ cwt. are carried on the coupled wheels.

Fig. 2 illustrates one of the 4–8–2 engines constructed for the harder duties by the same builders, also to Mr. D. A. Hendrie's designs. Coupled wheels are naturally smaller, 4 ft. 3 in., bogie wheels, 2 ft. 4½ in. and trailing wheels, 2 ft. 9 in.; but other dimensions are increased. Thus, the cylinders are 22½ in. by 26 in.; rigid wheelbase, 9 ft.; engine wheelbase, 31 ft. 9½ in.; steam pressure, 180 lbs. per sq. in.; tube heating surface, 2,312 sq. ft.; firebox heating surface, 158 sq. ft.; superheater surface, 669 sq. ft.; grate area, 40 sq. ft.; adhesion weight, 66 tons 11 cwt.; total engine weight, 92 tons 4 cwt.

Digitized by Google

The tender substantially corresponds to that used for the 4–6–2 engine.

Changing the venue, reference may be made to certain engines built for the 5 ft. 6 in. gauge railways of South America and India. Fig. 3 illustrates a 4–6–2 locomotive built by the North British Locomotive Co., Ltd., for the San Paulo Railway of Brazil. Similar engines are used on the Central Argentine Railway. The boiler and firebox of the San Paulo engine, the latter of Belpaire type, are very large and the cylinder dimensions considerable; but as very fast work is not called for, the diameter of coupled wheels is only moderate, reasonable speediness being combined with good load-hauling capacity. A Schmidt superheater is fitted, but the pressure is placed at the high figure of 200 pounds per square inch. The design is particularly neat in many ways, and attention is paid to appearance to the extent of providing a polished brass dome, with bright bands and mouldings round the barrel of the boiler, in addition to neatness of outline. Cylinders are 21½ in. by 26 in., coupled wheels, 5 ft. 6 in., heating surface, 2,029 sq. ft., grate area, 28·5 sq. ft., weight in working order 80½ tons.

The "Atlantic" type is so unusual except on high speed lines that special interest attaches to the 4–4–2 engines built a few years ago by Messrs. Kerr, Stuart and Co., Ltd., for the Taokow-Chinghua section of the Chinese Government Railway. Designed by Mr. D. Fraser, Locomotive Superintendent, these engines, shown in Fig. 4, possess special interest in that they represent advanced practice, with several notable features, and are of an unusual class for railways of the kind involved. The gauge is the usual standard, and the dimensions are considerable; but in view of the nature of the traffic to be worked, the coupled wheels are only 6 ft. in diameter. Bogie and trailing wheels have respective diameters of 3 ft. and 3 ft. 7 in. The boiler barrel is 4 ft. 9 in. diameter outside, and 15 ft. 10 in. long, and contains 193 tubes (2¼ in. diam.), giving 1,843·65 sq. ft. of heating surface. The Belpaire firebox supplies 132·35 sq. ft. of heating surface, making a total of 1,976 sq. ft.; and the grate area is 35 sq. ft. The cylinders are 19 in. by 24 in., with piston valves and tail rods for the pistons. Steam pressure is 180 lb. per sq. in. Engine and tender together weigh, in working order, 120 tons. Among the various fittings may be mentioned, acetylene head lamp, Smith's combined lubricator and cylinder vacuum-destroying valves, Westinghouse steam heating apparatus, Holden and Brooke steam sanding gear, Laycock automatic centre couplers, and other details in accordance with modern practice.

For about ten years no single-driver

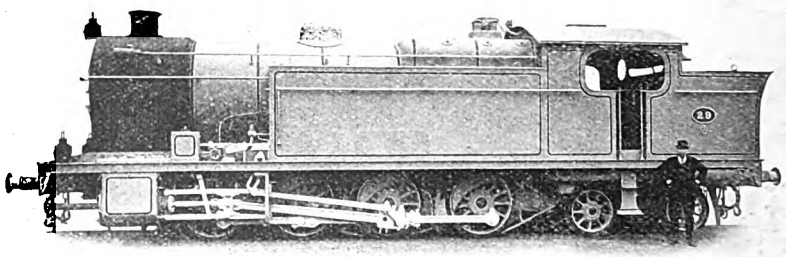


FIG. 7.—0–8–4 TANK ENGINE: GREAT INDIAN PENINSULA RAILWAY (5 FT. 6 IN. GAUGE).
Built by the North British Locomotive Co., Ltd.

locomotives, except a few small tank engines for rail-motor or like traffic, have been constructed, so far as the writer is aware, in any country; and for practical purposes the "single" engine may be said to have disappeared, although it must be remembered that in England, at any rate, there are large numbers of such engines still doing good service, in some cases on really hard duties. Therefore, the construction in 1910 of four single-driver locomotives in conformity with the most advanced principles of locomotive design is a matter of more than passing interest.

The builders are Messrs. Kerr, Stuart and Co., Ltd., and the engines have been supplied to the order of the consulting engineer of the Shanghai-Nanking Railway; but in their construction something like a record was achieved by the builders, the first engine being ready for testing in steam within

Digitized by Google

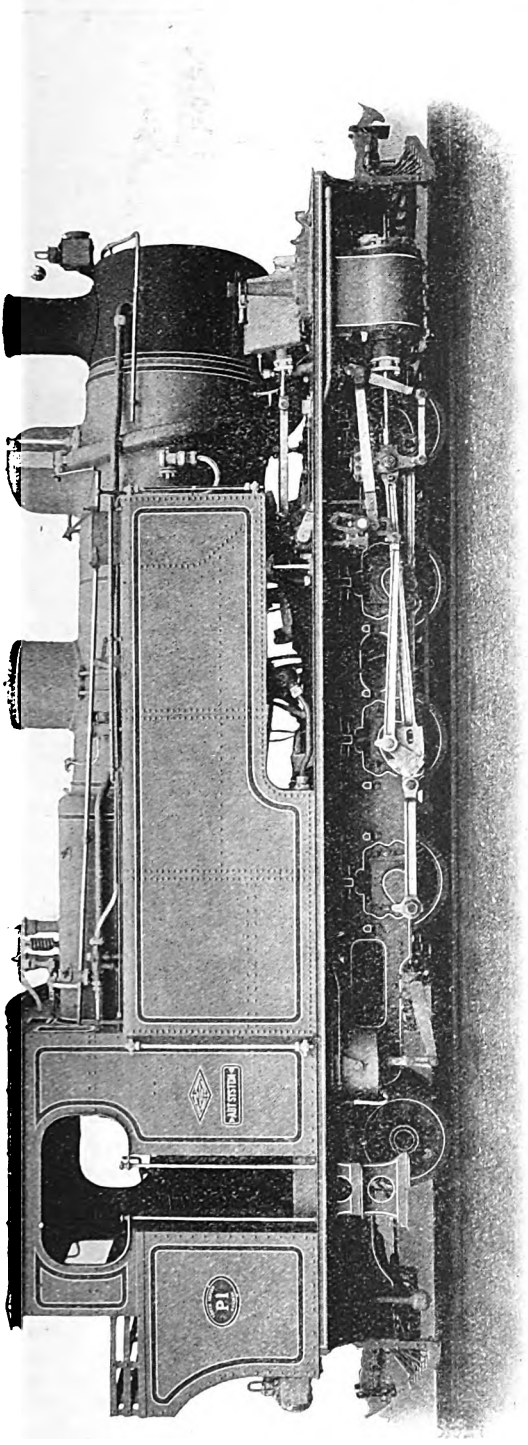


FIG. 8.—COMBINED RACK AND ADHESION LOCOMOTIVE: SOUTH INDIAN RAILWAY, NILGIRI SECTION (METRE GAUGE).
Built by the North British Locomotive Co., Ltd.

forty-seven days of the receipt of the order, while the others were only a few days behind.

At first inspection, one obtains from Fig. 5 the idea that these locomotives are of moderate size, with comparatively small driving wheels; but actually they are large, as will be appreciated when it is explained that the driving wheels have a diameter of 7 feet. The firebox is of the Belpaire type. Cylinders are 18 in. by 26 in., steam pressure 180 lbs. per sq. in., heating surface 1,650 sq. ft., grate area 28 sq. ft., weight in working order 60 tons.

Although British locomotive builders have constructed engines of nearly every wheel type in use, it is somewhat surprising that so few should have been built having ten coupled wheels. In fact, except for the 4–10–2 Reid tank engines built many years ago for the Natal lines and previously referred to, the only ones known to the writer are the large 2–10–0 goods locomotives built by Messrs. Robert Stephenson and Co., Ltd., of Darlington, England, for the Argentine Great Western Railway, and shown in Fig. 6. The wide gauge (5 ft. 6 in.) allows considerable freedom of design, but even when this is considered, the engines are very large and powerful, the boiler, which is provided with a huge Belpaire fire-box, being of great size.

Cylinders are 19½ in. by 28 in., coupled wheels 4 ft. 3 in., steam pressure 180 lbs. per sq. in., heating surface 2,440 sq. ft., grate area 36 sq. ft., weight of engine in working order 79½ tons.

Some years ago the North British Locomotive Co. built some 2–8–2 tank engines for the Great Indian Peninsula Railway of a notable design,

Digitized by Google

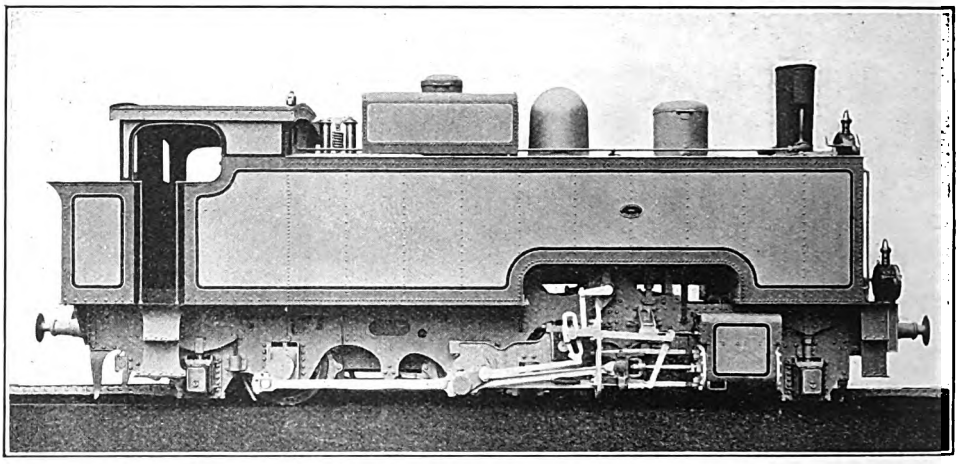


FIG. 9.—COMBINED RACK AND ADHESION LOCOMOTIVE: IMPERIAL RAILWAYS OF JAPAN (3 FT. 6 IN. GAUGE).

Built by Messrs. Beyer, Peacock & Co., Ltd.

and Fig. 7 illustrates a somewhat similar class, of the 0–8–4 type, on the same railway. Thereon a Schmidt superheater is used. The gauge is 5 ft. 6 in., cylinders 22 in. by 26 in., coupled wheels 4 ft. 3 in. diam., bogie wheels 3 ft. diam., rigid wheelbase 15 ft. 6 in., total wheelbase 28 ft. 4 in., steam pressure 160 lb. per sq. in., heating surface—tubes 1,552 sq. ft., firebox 172 sq. ft., superheater 436 sq. ft., grate area 32 sq. ft., adhesive weight 78 tons 19 cwt., total weight in working order 102 tons 1 cwt., tank capacity 2,500 gallons, fuel space 157 cub. ft. These engines are used principally for banking service on the mountainous sections.

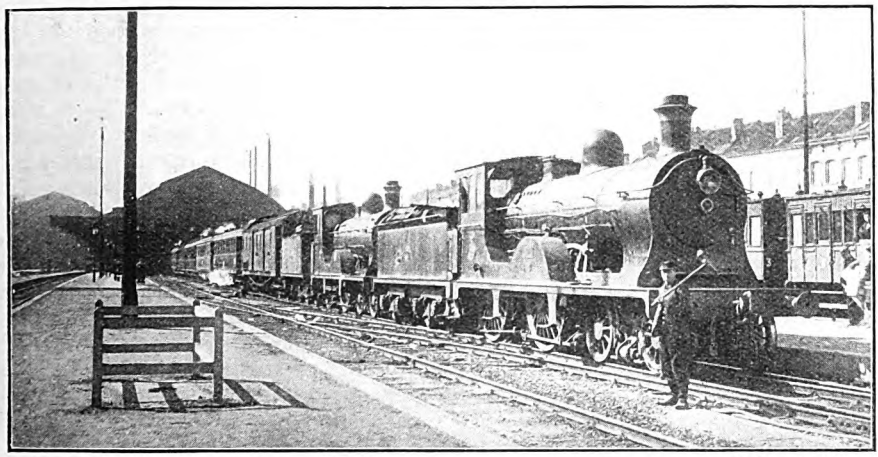
Mention may also be made of a metre gauge design built by the Vulcan Foundry Co., Ltd., of Newton-le-Willows, for the Transandine Railway, in which the 2–8–4 wheel arrangement is also employed. Leading dimensions are :—Cylinders 18 in. by 20 in., driving wheels 3 ft. 6 in., heating surface 1,630 sq. ft., working pressure 200 lbs., weight 72½ tons.

In concluding this section reference may be made to combined rack and adhesion locomotives. These engines are used in many parts of the world. They are constructed to work on mountain railways, which have, on their steeper grades, a rack-rail laid in the centre between the two ordinary rails. They are fitted with a pair of outside cylinder engines for working in the usual way by the adhesion of the wheels. They are also fitted with a pair of inside cylinder engines for working, through a pinion, on to the rack-rail, and acting quite independently of the adhesion engines.

Fig. 8 illustrates a 0–8–2 locomotive of this class built by the North British Locomotive Co., Ltd., for the Nilgiri section (metre gauge) of the South Indian Railway. The Abt system is employed, and the engines are capable of taking loads of 130 tons by adhesion alone on a grade of 1 in 25, while by combined rack and adhesion they will work 115 tons on 1 in 20, 90 tons on 1 in 16 and 65 tons on 1 in 12½. These loads are additional to the weight of the engine. The inclined position of the boiler barrel may be noted.

Fig. 9 illustrates a 2–6–2 engine built some years ago by Messrs. Beyer, Peacock & Co., Ltd., for the Imperial Railways of Japan (3 ft. 6 in. gauge). Leading and trailing wheels (2 ft. diameter) are fitted in Cartazzi axle boxes. Coupled wheels are 3 ft. diameter, operated by 15½ in. by 20 in. outside cylinders with Walschaert valve gear. Inside there are two rack cylinders 11¾ in. by 16 in. The boiler has a Belpaire firebox, and is inclined somewhat to compensate for the effect of the gradient upon the water level. Heating surface is 1,268·7 sq. ft., and grate area 19·9 sq. ft.; boiler pressure is 180 lbs. per sq. in. Tractive power per lb. of mean effective pressure in cylinders is 126·7 by the rack cylinders and 133·47 by the adhesion cylinders, making a total of 260·17 for combined traction. 1,520 gallons of water can be carried, with 70 cubic ft. of fuel space. Weight in working order is 58 tons.

Digitized by Google



Photo] [*M. G. S. Blane.*

BELGIAN STATE RAILWAYS.

Double-headed express leaving Brussels—Nord.

Belgian Railway Policy.

By W. PARKER.

AT a time when Belgian affairs are attracting world-wide attention, it will not be out of place to devote some space in the RAILWAY MAGAZINE to consideration of the policy that has been pursued in railway matters by the rulers of the gallant little nation whose soldiers have achieved immortal fame in the remarkable defence of their country against the invader.

Transport by means of locomotive engines was in its first blush of youth when the first Belgian railway was suggested. The proposition was to build a line from Antwerp to Liége and afterwards continue it to Cologne. This was in 1832, but the actual development of the Belgian railway system began in 1834 by the passing of a law confirming the institution of a government scheme of railway construction.

In 1835 the first section from Brussels to Malines was in use for traffic, and this line was afterwards extended to Antwerp, Verviers, and to the Prussian frontier. Although these and other new lines constructed at this period were built and worked by the State, it was considered by the general public that the new manner of transit was too expensive to become general, or to permit of the carriage of heavy goods by reason of the competition of the canals and other waterways, and this attitude goes far to explain why, even in those early days, it was necessary for the State to undertake this work, instead of private corporations, as occurred in most other countries as regards the initial stages. The low rates for conveyance, rendered necessary by circumstances, gave such poor financial returns, that when the Government suggested more schemes of railway extension, the Chambers of Legislature would sanction no further outlay, and it remained for private enterprise to continue railway construction.

Government concessions of various kinds were made to several private companies: in some cases a company would build the lines which were then operated by the State; but in others a company would carry out both construction and operation.

It was soon found that by combining together the private companies could, in the latter case, compete with great effect with the original State lines. Then came the fear that the companies might fall under the control of foreign financiers, and the Belgian Government were induced to embark upon the policy of acquiring the railways and this course has been followed consistently since 1871. As a natural result came the unification of tariffs and the regulation of such competition as exists between the railways and waterways of "the cockpit of Europe."

Digitized by Google

Between the years 1857 and 1900 the State purchased 19 concessions, and in addition the transfer of the West Flanders Railway, was concluded on New Year's Day, 1906.

Belgian railways built to the usual standard gauge are known as "Chemins de fer à grande section." This may be divided into three classes: (1) Lines constructed and worked by the State; (2) Lines constructed by companies and worked by the State, which pays over a portion of the receipts or a fixed sum as rent, and (3) Lines both constructed and worked by private companies.

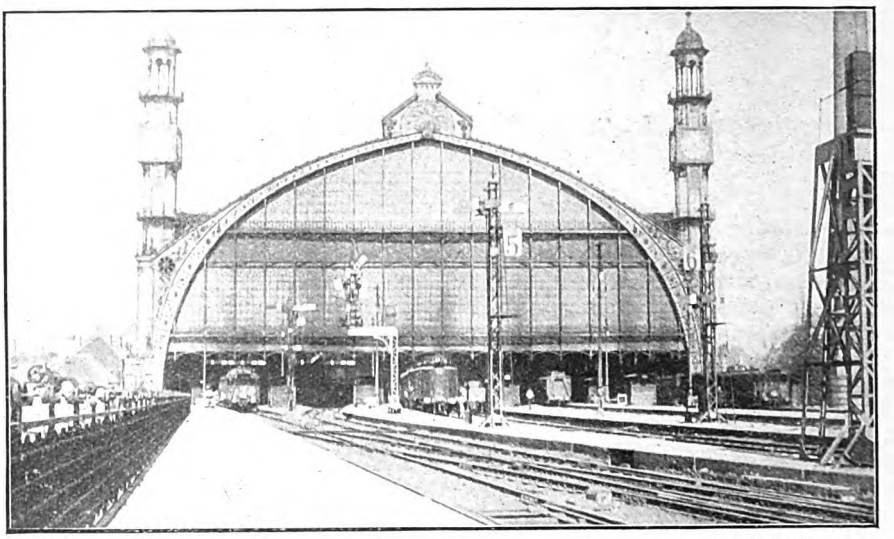
In addition to the heavy railways above mentioned there exists in Belgium a very extensive system of light lines of metre gauge. These are called the "Chemins de fer Vicinaux."

Taking the case of the West Flanders Railway as an example of State acquisition of a private railway system, several items worthy of recapitulation come to mind. In passing, it may be mentioned that although the purchase of this railway took place on 1st January, 1906, the Company continued to work the railway for the State during 1906 and 1907.

Consisting of five concessionised lines, making a total length of 178.692 km. of which 14.722 are in French territory, the West Flanders Railway originally only connected Bruges with Poperinghe *viâ* Roulers, Courtrai, Menin and Ypres, with a branch line from Ingelmunster to Deynze. This was the first concession granted to private individuals, the company receiving royal sanction in 1845. The Government had despaired of seeing various large railway enterprises carried out, and were pleased to accept the assistance of private capital, even though part of it came from foreigners. Later concessions followed at various dates down to 1887.

State purchase was eventually brought about in 1906 for several reasons. One of the principal was that the international relations between France and Belgium rendered it necessary to build a double line between Bruges and Courtrai for the express service between Paris and Lille in French territory, and Ostend, Blankenberghe and Heyst in Belgium, while the Government was not in a position to enforce the construction of this line while the Company remained in private hands. Therefore it became desirable that the lines conceded to the West Flanders Railway Company should be incorporated into the State system.

Broadly the most common reason given in Belgium for State purchase of railways is that so far as this particular country is concerned private ownership exhibited grave disadvantages. The completion of trunk lines, which are largely extensions one of another, caused disputes between the



Photo] [*M. G. S. Blane.*

BELGIAN STATE RAILWAYS.
Antwerp Central Station.

Digitized by Google

proprietors as to rates, use of joint lines and stations, and the regulation of train services. Again, the inevitable result of the difference between the methods of State and Company working was extremely prejudicial to public interests, which were better served by the State lines.

In the past Germany, as well as France and Holland, have been formidable trade rivals of Belgium, and for this reason Belgian railway rates have always been kept at the lowest possible figure. The policy has been to make railway profits subservient to the development of national commerce, besides that of home industry and agriculture. Belgium has, likewise, devoted large sums to the extension and improvement of its ports, especially that of Antwerp, whence diverge not only the great railway routes, but also the comprehensive system of waterways by which Belgian territory is so efficiently served.

A Belgian custom is to pay all railway carriage charges daily; but there are certain firms who have ledger accounts, and in these cases the full estimated cost of carriage must be deposited in advance with the railway concerned. On this matter of deposit the railways are very particular, and it is necessary to find a guarantor for each deposit. Under certain conditions Belgian railway regulations permit the construction of private stations and sidings connected with the State lines. When a private siding is required application is made to the Minister of Railways, Posts and Telegraphs for the necessary sanction. The Minister then institutes an inquiry, which is made on clearly defined lines. Particular information is required as to the amount of traffic from the works or factory to be served, and the pecuniary advantage in view of which the siding is requested. Private wagons may be used by traders for the transport of goods in full truck loads.

The policy adopted throughout Belgium is that goods must go by the shortest available route. Rates are practically uniform. State ownership being so extensive, there is little competition between the standard gauge railways, and as regards the light railways no active competition exists owing to the State supervision of the rates to be charged thereon; so that when a section of a light line comes into competition with any portion of the State lines the rates to be charged on the former are kept at a higher figure. There is a system of insurance in force on the State railways whereby traders may ensure delivery of their goods in good condition and within the period allowed for the consignment according to the tariff used. This insurance is widely used in Belgium and many coal merchants even make it their practice to effect this insurance, as it means that the goods are better looked after and reach destination earlier than they otherwise might.

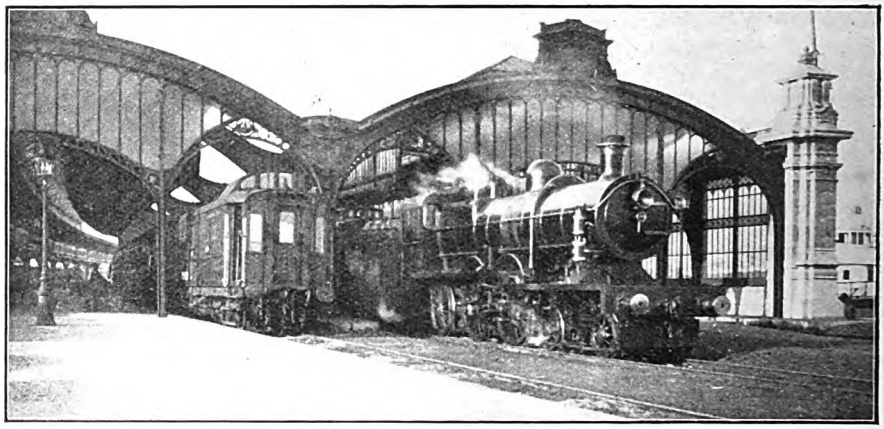
It is a very rare occurrence for any claim to be made against the railways for delay. The rules concerning the packing of goods and claims for damage are somewhat leniently enforced, and it is only on rare occasions that the State takes advantage of the regulations to evade paying a reasonable claim for loss and damage. The State railways do not deal harshly with traders in the matter of demurrage, and they have a good name among traders for impartiality. When granting a reduced rate to an applicant for any commodity, it is the custom to advise other firms likely to be interested. Requests for reduction of rates are not frequent.

Passenger tariffs present some peculiarities to the British mind. For children eight years is the limit for half fares. Dogs accompanying passengers must be paid for by purchasing a third class ticket for each canine traveller. Passengers travelling with bicycles can take them as luggage at certain charges, but are required to co-operate with the railway staff in getting the machine on and off the train.

Articles dealing with the administration, services, rolling stock and other features of the Belgian State Railways appeared in the RAILWAY MAGAZINE for December, 1911, and January and February, 1912, and for more minute particulars, copies of regulations, tariffs and facts concerning Belgium's waterways and their connection with the railways, the reader may be referred to the report made to the British Board of Trade by Mr. Mervyn L. Chute, published as a Government Blue Book.

Mr. Chute's general conclusions are worthy of record here. The railway policy of the Belgian Government is eminently paternal. Its chief aim is to secure the welfare and commercial prosperity of the country. Neither courage nor enterprise has been lacking to carry out any scheme which promises to benefit the community. It is this spirit which inspires the relations of the Government not only with the main railways but also with the waterways and

Digitized by Google



Photo] [*M. G. S. Blane.*

BELGIAN STATE RAILWAYS.
Express leaving Ostend Quay.

light railways. In pursuance of this policy the State has acquired a large proportion of the main railways since 1870.

It is a moot question, depending on the point of view adopted, whether these railways yield a profit or not, but if there be such a profit, it is certainly a comparatively insignificant one. With regard to the waterways, it is evident that they are run at a considerable annual loss, whilst the State takes up 50 per cent. of the shares of light lines and guarantees the interest to private shareholders. These light railways are admirably adapted for fostering the interests of agriculture and small industries.

At the large centres and ports the commercial section of the community are favourably served by the Government railways, both as regards the transport of goods and the prompt settlement of reasonable claims, this being no doubt partly due to the desire of the State to foster the import and export trade and assist local industries. Belgian traders consider their railways are administered on commercial principles, which point of view can be well understood, seeing the railway rates are reduced to an extent which permits of very little profit or none at all, and that the transport regulations, such as the packing of goods and demurrage, are not enforced with any degree of rigidity.

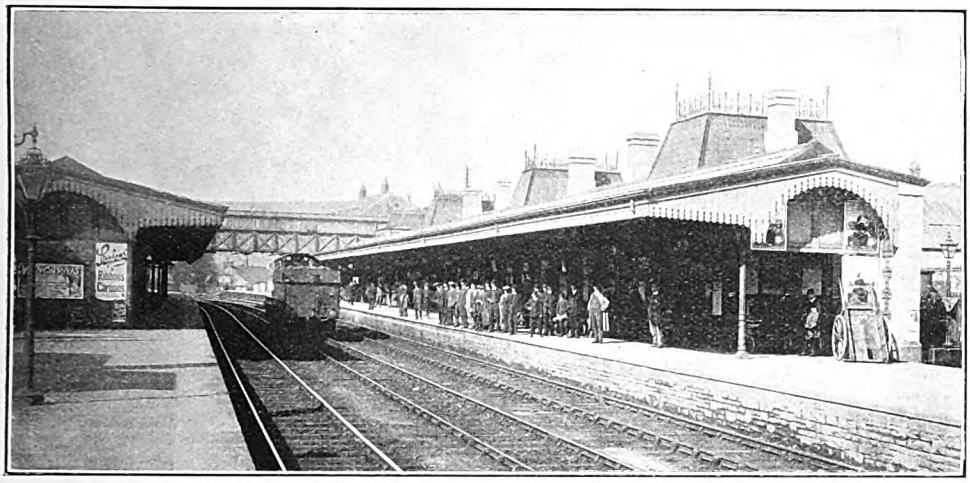
Season tickets are issued which are available over all the railways. The price of a third-class yearly season ticket available over all lines is about £15, but if paid for by quarterly instalments it amounts to £16 10s. In addition to these, 15 and 5 day tickets are issued, available everywhere in Belgium, the cost of the former being under £2 10s. for the first-class and £1 for the third-class, no limit being placed on the extent of the travelling so long as this is within Belgium. Workmen's weekly tickets are issued at very reduced rates.

As regards passenger accommodation, very few first-class compartments are provided on local trains, the principle being to set apart a small number of second-class compartments, which are termed "Reservé," for the benefit of first-class passengers. Third-class carriages occupy by far the greater portion of the train, and the remainder is made up of second-class compartments. The carriages provided for the third-class passengers are by no means so well appointed as those on British railways.

Apparently, the scheme for the main standard gauge railways is complete, and further development is left to the "vicinaux" lines and waterways. This is not a matter of wonder, as in proportion to its area and population Belgium possesses a greater length of line than any other country.

The general tendency of the foregoing considerations would seem to indicate that the policy of the Belgian State is a consistent one. It is true that financial profits derived from railways are almost negligible, and the waterways are operated at a considerable loss. The Government is, however, apparently content to forego any pecuniary advantage from its railways and waterways in order to promote the industrial and commercial well-being of the country.

Digitized by Google



Harry Jones] [*Windsor Road, Neath.*

NEATH STATION, GREAT WESTERN RAILWAY.

The Vale of Neath Railway.

By HERBERT RAKE.

THIS railway, with its rich mineral resources, passes directly through the romantic scenery for which the Vale of Neath is so justly famed, and which assumes a richly wooded character within a few miles of the town of Neath.

The Act authorising the construction of the railway provided for a capital of £600,000, with the usual borrowing powers, and was obtained in the session of 1849. It was to extend from Neath in a north-eastern direction, following the course of the river to Pontneddfechan, after which it was to turn due east, and by means of a tunnel through the intervening mountain, cross into the Taff Valley, terminating at Merthyr Tydvil, a course of about 22¾ miles. Sixteen miles, as far as Hirwain, were completed in 1851 and it was arranged that it should be worked in connection with the South Wales Railway, so as to form a continuous broad gauge communication with Swansea, as well as with the shipping staithes on the river Neath. A branch to Baglan Bay had been projected, and in 1851, bills were also authorised for lines up the Dare and Amman Valleys, which were opened in 1855.

Arrangements were then concluded with the South Wales Railway, for jointly laying an additional pair of rails west of Carmarthen (beyond which the former had hitherto been a single line only) to facilitate coal shipments at Milford Haven, then considered to be the great Trans-Atlantic port of the future. The work referred to was completed in 1858. The docks at the mouth of the River Neath, authorised in 1855, were opened towards the end of 1860, thus enabling the shipment of coal and other minerals at the port of Briton Ferry, with which the South Wales Mineral Railway, connecting with the Afan Valley and the Glyncorrwg Collieries, was in communication.

In laying out the course of the Vale of Neath Railway, it had been found impracticable to avoid heavy gradients, more particularly in the upper portions of the line, one of which, 4½ miles in length with an intermittent space of 1 in 60, necessitated the use of tank engines of a special type which were constructed at the works of the Neath Abbey Iron Co. Between Hirwain and Merthyr, a distance of 6½ miles only, the works were so heavy as to involve the excavation of 2,480 yards of earth-work, excluding the tunnel approaches, all in solid rock.

The length of the tunnel was 600 yards and the railway was opened to Merthyr on October 26th, 1853. The event was celebrated by a luncheon, held at the Castle

Digitized by Google

Hotel, Neath, a special train leaving Merthyr in the morning to convey the invited guests, and great were the anticipations indulged in at the post-prandial utterances on this occasion, one speaker predicting a second Taff Vale in the future prosperity of the Vale of Neath Railway.

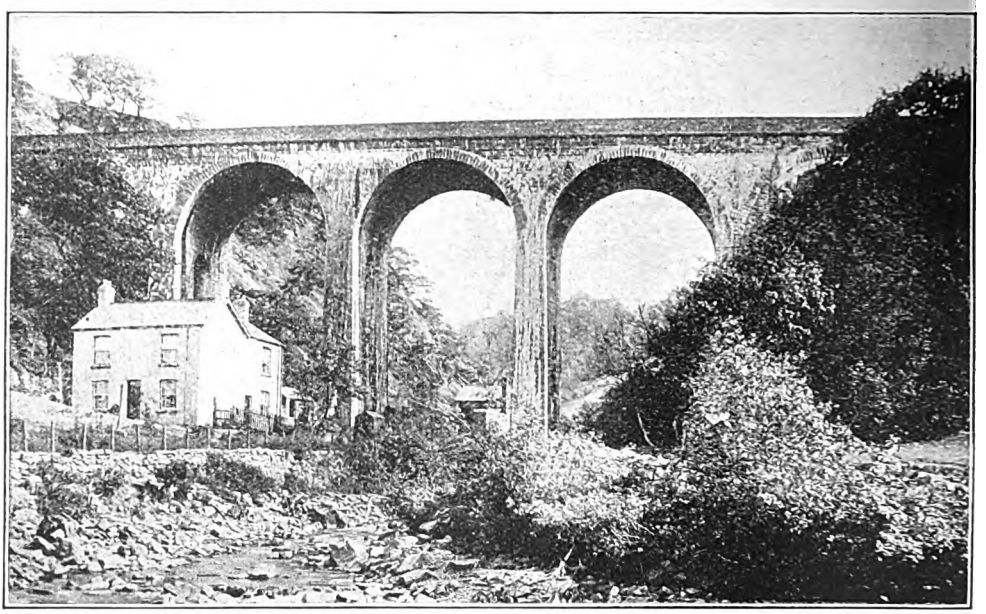
It was announced that the Dowlais and other large iron works at Merthyr, as well as colliery owners in the district, had already taken steps to secure communication with the railway for the purpose of shipments at Swansea and Neath.

The Cwmamman branch was completed in 1852, and the opening of the branch at Baglan Bay, an inlet at the north of the river, during the same year, materially served to increase the mineral traffic. An extension to Swansea, projected as the Swansea and Neath Railway Company, an independent concern on the mixed gauge, was to run along the right bank of the river and over the Crymlyn Burrows to a terminus in Wind Street, Swansea, thereby effecting a saving in distance of fully 5½ miles as compared with the route *viâ* Llansamlet, also avoiding the heavy Skewen bank, but owing to the opposition of the South Wales Railway it was not immediately proceeded with.

Later on an amalgamation was effected between the Swansea and Neath, and the Vale of Neath Companies, at which time the latter had become mixed gauge, and in 1863 a branch was authorised to connect with the Brecon and Merthyr Railway, a line projected to establish in connection with the Mid Wales and Cambrian Railways, a direct communication between South Wales and Manchester and Liverpool.

A branch was also authorised to connect with the projected Merthyr, Tredegar, and Abergavenny Railway. Under an agreement with the South Wales and West Midland Railways, it should be mentioned that the directors of the Vale of Neath Railway had been required to lay in the narrow gauge, but it was determined to relay the line throughout on the narrow gauge only, and take up the existing broad gauge rails, replacing them with double-headed rails of a heavier section. This large outlay was considerably reduced by the discovery that the old longitudinal timbers were in so sound a condition as to enable their being for the most part utilised in the conversion.

The Swansea and Neath Railway was opened from Swansea on August 1st, 1863, to the low level station at Neath, the original Vale of Neath terminus. In January,



Harry Jones] [*Windsor Road, Neath.*

VIADUCT OVER RAVINE BEYOND PONTNEATH VAUGHAN.

Digitized by Google

Photo] [*Harry Jones.*

HORSESHOE FALLS ON THE RIVER NEATH, NEAR PONTNEATH VAUGHAN.

1864, the Vale of Neath purchased the Aberdare Valley Railway, which was afterwards continued to a junction with the Taff Vale extension of the Newport, Abergavenny and Hereford Railway. This enabled a through narrow gauge service from Hereford *viâ* Pontypool Road through Aberdare, and over the Vale of Neath Railway to Swansea (Wind Street). A working arrangement was then concluded with the West Midland, and in February, 1865, the Great Western Railway acquired the Vale of Neath Railway in its entirety, under a lease in perpetuity on the basis of a 5 per cent. guarantee with a moiety of surplus profits.

The Vale of Neath comprises one of the loveliest districts of South Wales. The River Neath in its passage from the romantic region amidst the Breconshire mountains in which it has its source, receives a number of tributaries, which descending rapidly through deep ravines produce falls of considerable elevation and great beauty. The first feature of interest starting at the mouth of the river is presented by the ruins of Neath Abbey, a Cistercian foundation dating from 1101, referred to by Leland as the "fairest in all Wales," but now in a sadly begrimed condition from the proximity of the collieries, iron and other works with which the locality abounds.

Neath Abbey station is about a mile from the town of Neath, being the first station on the Swansea extension. The ruins consist of the walls and the nave, with the entrance to the cloisters, portions of the south transept, the refectory, the crypt and the shell of the priory house.

Proceeding by rail from Neath, we first pass Catoxton Junction where diverges the Neath and Brecon Railway communicating with the anthracite coalfield in that valley, and at a distance of 2 miles reach Aberdulais, where the special features of the valley commence, the country assuming a richly wooded and fertile character. The first of the cascades to be noted is on the Dulais tributary, which here joins the River Neath. At the distance of four miles further is the hamlet of Abergarwedd, near which is the picturesque fall of Melin Court formed by the River Clydach, which is here precipitated about 60 feet and from its elevation and the peculiar forms of the rocks, it partakes of considerable grandeur. Revolven is the nearest station on the line.

At Rheola, about two miles further on, and onwards to Aberpergwm, the grandeur of the mountain range on the right contrasts finely with the more gentle beauties of the vale.

Two miles further is Pontneddfectian, *i.e.*, the bridge on the Upper Neath, commonly spelt and pronounced Pontneath Vaughan, a small hamlet with a tolerable inn, the best in the neighbourhood. Not far from here are the beautifully wooded ravines conveying the streams respectively of the Hepste, Mellte, Perddyn, and Neath. The valley is shut in at the head by a long and precipitous crag, known as the Dinas Rock, and adjacent to it is another natural curiosity, the Bwamarn or stone bon, sometimes called the Chair of the Witch.

The Vale of Neath Railway follows closely the direction of the road and rises and affords a view of the scenery of the Valley. The town of Neath is now brought within about 3½ hours of the Metropolis by the express service of the Great Western Railway, and the valley trains are accommodated in the town station.

Digitized by Google

Leaves from the Log of a Locomotive Engineer [No. XXVI.].

By ROBERT WEATHERBURN.

[*Following Mr. Weatherburn's interesting and illuminative reminiscences of a long and notable career as a locomotive engineer, we have pleasure in giving an instalment of further remarks based upon correspondence created by the publication of these articles. Ed. R.M.*]

AS stated in the opening chapter of "Leaves from the Log of a Locomotive Engineer," the writer was primarily actuated by a desire to impart his somewhat varied experiences with the hope that they might be of some service to the coming generation of railway engineers and other railway workers; and perhaps further to afford some slight interest to the general or casual readers of the RAILWAY MAGAZINE. Secondly, he felt it a duty, as well as a "labour of love," to do his humble best in endeavouring to rescue from the oblivion of neglect and misapprehension, almost amounting to malappropriation, the names and memories of some of the gifted and able men whose sterling, yet unobtrusive work, contributed so much to the present status of the locomotive during the eventful third and fourth decades of its history. Hence the biographical sketches given, which were more or less qualified by personal acquaintance or experience. His reward in this respect has been more than ample, as new stores of information hitherto unexplored have been placed at his disposal derived from family archives and supported by unquestionable evidence.

Regarding the first. Judging by the large number of letters and other communications received direct, and some through the courtesy of the Editor, from correspondents residing in nearly every quarter of the globe where the RAILWAY MAGAZINE is in circulation, the hope expressed has been more than justified.

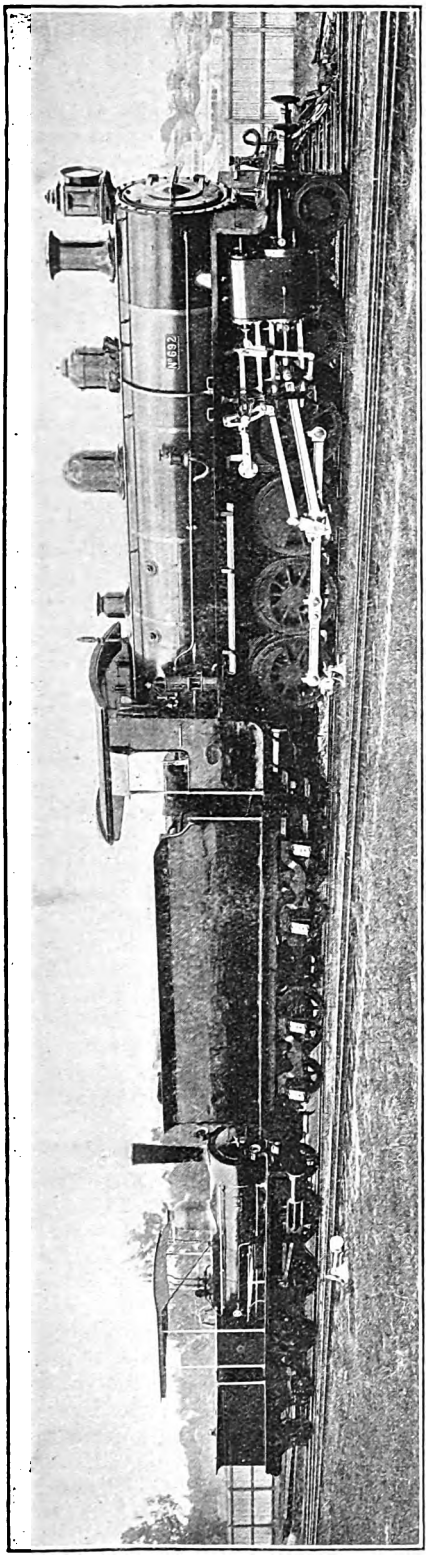
What is still more gratifying, these experiences have been the means of revealing the existence and whereabouts of several old friends, acquaintances and pupils, some long since lost sight of and almost forgotten, who now reside under tropical skies or in southern and eastern climes, and claim and qualify renewed friendship by quoting past events, and reminiscences common to both.

The writer never for one moment supposed that his opinions and views would meet with the endorsement of all his readers, and a few have justly exercised the right and privilege of dissenting on certain points, but with a singular absence of anything pertaining to hostile or objectionable criticism, and though already perfunctorily acknowledged, he takes this opportunity of replying more fully, and the more readily, as he may thus satisfy other doubters, if such exist.

In Chapter 10, page 48, July, 1913, the writer, when describing the difficulty of railway working in severe frosty weather in Russia, among other things, mentioned the occasional freezing up of glass water gauges when running in back gear. Mr. George Garwood, formerly "Natchalni Trakti" (Locomotive Superintendent) on the Nicholai-Moscow Railway, and who afterwards held a similar appointment on the Sevastopol Railway, assured the writer that such had occurred under his own personal supervision. The seeming improbability of such an occurrence from the standpoint of our own more sedate climatic conditions, may have caused Mr. Benson to treat it jestingly, with what he terms "a prick with the Ithuriel spear of science." Leaving out the Miltonian legend, a moment's presupposing of certain conditions will not only bring such events within the range of probability, but actual possibility.

The communication passages in the flanges of water gauges are rarely if ever more than $\frac{1}{16}$ in. diameter. Should they by mischance or mistake be larger, then the explosive force caused by a broken glass would be much more severe and difficult to control than steam and water from smaller vents. It must be remembered, too, that at that time there were no glass protectors or "explosion guards." Even the use of bad water and consequent rapid incrustation in the lower aperture, with the neglect of periodic cleaning out

Digitized by Google



OLD AND NEW LOCOMOTIVES: QUEENSLAND GOVERNMENT RAILWAY (3 FT. 6 IN. GAUGE).

by rimers and blowing through, would cause the circulation to become sluggish and tardy with a corresponding loss of heat.

The unskilful use of indiarubber jointing, or mastic cement, causing the squeezing up or blocking of holes, may have caused an obstruction sufficient to prevent effective blowing through, while the fact must not be overlooked that the boiler pressure commonly in use at that period in the locomotives of the Great Northern Empire was rarely more than 9 atmospheres with an equivalent temperature of 347·2°; possibly the temperature was lower through want of steam. So that the more than doubtful and somewhat ambiguous comment of my correspondent Mr. Benson—who will I hope pardon me for not having more fully answered his enquiry previously—loses weight. Modern practice makes use of a $\frac{5}{8}$ in. or $\frac{3}{4}$ in. boss on the flanges in order to prevent the intrusion of the packing (jointing) used.

In writing about the narrow gauge system of railways adopted by the Queensland Government the writer was not without experience of his own, and readily acknowledges the narrow gauge as a great boon when applied to agricultural or pastoral districts with a sparse population, with remote chances of development, further as auxiliary or feeders to larger systems. Evidently such views are not shared or endorsed by Col. Evans, C.M.G., Commissioner of Railways in Queensland. That gentleman has kindly expressed his arguments—per contra—through the medium of Mr. A. H. Darker, an old pupil and friend of the writer, as follows:—"It might probably interest Mr. Weatherburn to know that the Queensland Government is satisfied with the results, as is evidenced by the additions already made and making to the system. In fact, Parliamentary sanction has been given for 1,855 more miles." Now the writer frankly admits his predilections for a more generous gauge than 3 ft. or 3 ft. 6 in., and will so far content himself with one argument, namely, the inadequacy of the present provisions for the future development of so rich and promising a country. Fifty years hence Queensland will be in a position to judge, but during a portion of the interregnum must suffer inconvenience in proportion to the increase of population and trade.

Promptness, and expedition in the future, will as a matter of course be demanded, to meet increased requirements as well as the nature of goods in transit. Both these

Digitized by Google

requisites will be severely handicapped by changing and transhipment. However, it is only fair to give the principal arguments and figures which Col. Evans has so courteously supplied, and to acknowledge the frankness of his admission—without the after qualification in his third paragraph which may in the future be considered of chief importance—"that the transport of troops (and material) over long distances could be carried out in less time with a uniform gauge." Without prejudice, and with no desire to fire a Parthian shot, I would respectfully ask Col. Evans one question, namely, were the Queensland Government in a position, as in the beginning, to make a selection, would they still prefer the 3 ft. 6 in. gauge? He writes:—

"On December 31st last there were in Australia nearly one thousand more miles of 3 ft. 6 in. gauge railway than the two wider gauges added together, the figures being: 3 ft. 6 in. gauge, 9,562 miles; 4 ft. 8½ in. gauge, 4,061 miles; 5 ft. 3 in. gauge, 4,520 miles. I would remind you that at the end of last year there were in South Africa 7,760 miles of 3 ft. 6 in. gauge and 474 miles of 2 ft. lines, while in India there are no less than 14,375 miles of 3 ft. 3⅜ in. gauge and 2,525 miles of narrower lines.

"Doubtless it would be a convenience to be able to send mails, etc., throughout Australia on one gauge, but the advantages from a passenger point of view are not so great as is commonly supposed. In Canada and the United States the same carriages run through from sea to sea, but it must be admitted that it would be a comfort to the passenger to change trains two or three times *en route*, as is done when crossing Siberia (although there is no break of gauge there); and in Australia it is certainly pleasant to change into a fresh, clean train after being all day in one carriage. It is true that the handling of goods at the stations where the gauges change cause some delay and expense, but the extra cost for the amount of traffic which crosses the borders would not go far towards paying interest upon the cost of making the gauges uniform. Probably we shall have one gauge between Sydney and Brisbane, but I do not think the 3 ft. 6 in.

"It is undeniable that the transport of troops over long distances could be carried out in less time with a uniform gauge, but in my opinion the advantages are overestimated, as men and horses can easily walk out of one train and into another, and it would be far cheaper and more expeditious to provide several depôts at convenient centres, with duplicate stocks of guns, ammunition, and stores, rather than alter the lines to provide a uniform gauge throughout and transport enormous quantities of warlike material for great distances from one State to another.

"The possibilities of the 3 ft. 6 in. gauge have not by any means been reached in Australia; a great deal more can be done (and no doubt will be) as the roads are improved in the future. It is not only the width of track which governs the speed or the engine load, but curves, grades, weight of rail and general stability of the road. On the metre gauge lines in India heavy loads are common; on parts of the Bengal and North Western line, for instance, goods engines haul 800 tons, while on the Rajputana-Malwa Railway the load is 600 tons, and on the Madras and Southern Mahratta line 450 tons. The heaviest passenger engine we have in Queensland (4–6–0) weighs, with tender, 80 tons 14 cwt., and the heaviest goods engine (4–8–0) 91 tons; the axle load is 12 tons on 60 and 75 lb. rails. The heaviest engines on the wider gauges in New South Wales and Victoria weigh 109 tons (with tender); in South Africa we find 4–6–2 engines weighing 117½ tons, and 4–8–2 engines weighing 142 tons 14 cwt., while the immense 2–6–6–2 engines of the Mallet type turn the scale at 153 tons 19 cwt. On the 4 ft. 8½ in. gauge lines in Great Britain the majority of the engines now being built range (with tenders in working order) between 100 and 120 tons, and few are heavier than that, so that South Africa with its 3 ft. 6 in. gauge is well to the fore; in fact, she has no less than 190 engines with a tractive force of over 30,000 lbs. each; her railways carried an immense traffic during the Boer War, and did the work well.

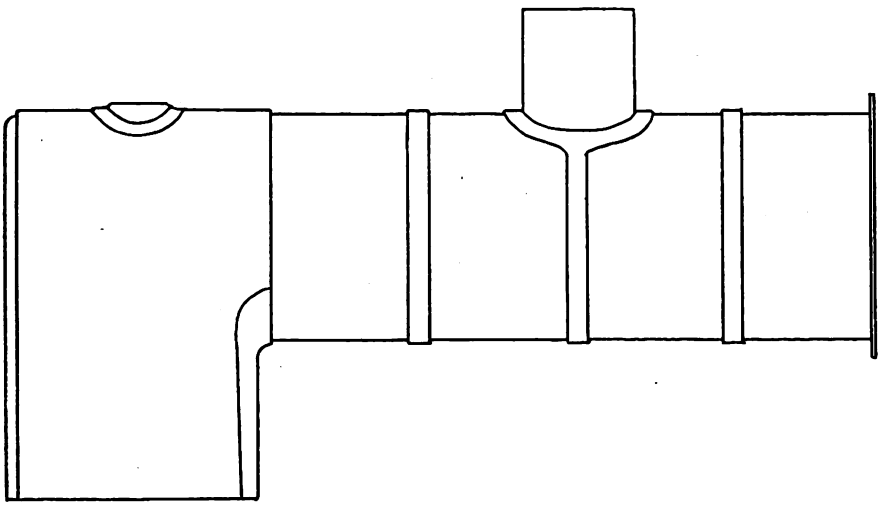
"The carriages built during the last few years in Queensland are 8 ft. 9 in. in width, while in South Africa they are 9 ft. on the 3 ft. 6 in. gauge. The best coaches in New South Wales and Victoria are 9 ft. 6 in. wide. I am aware that still more roomy carriages have been built in some other countries, but what we have to consider is not so much what is possible upon the wider gauges compared with a 3 ft. 6 in., but what is actually being done at the present time, and the vehicles now running in Queensland and South Africa are wider than the great majority of carriages on the 4 ft. 8½ in. gauge in Great Britain."

Digitized by Google

The writer has been somewhat explicit in his relation of trades unions methods as experienced by him, and in return has had the satisfaction of having the approval of his readers, some of whom are still members, subject to its drastic rules, fines and levies, or in other words exactions, and who, like himself, for many years have been compelled to contribute to organisations and policies for which they have neither sympathy nor respect; otherwise they must forfeit the whole of their contributions. No doubt the position of these correspondents is more eloquently and tersely stated by one in his fifty-fourth year who writes "My prolonged membership is due now to my desire of getting a little of my own back in the way of superannuation; in the meantime I must endure much humiliation and loss of self-respect."

To young and aspiring mechanics desirous of raising themselves above the mediocrity of the thinly veiled procrustean socialism entailed by membership, the writer would strongly urge abstention. The plea for co-operation and brotherly help is merely a specious argument to cover intimidation amounting to the worst form of coercion.

No State or Commonwealth could with impunity put such restrictions on individual freedom of action, or forbid the undoubted right of a man selling his labour in his own market and valuation. Chief inconsistency of all, the very men who clamour for the liberty of the subject are the first to deny it to others. Even their argument as a friendly society in connection with superannuation—at one time a cogent one—no longer tells, as much larger benefits can be obtained from any sound insurance society at much less cost. The argument so freely used of obtaining work for unemployed members was at the most only partially true, and at the best resulted from implied pressure. Labour Bureaus have deprived them of this pretext now. Finally, that the end justifies the means and sanctifies the weapons used, has long been the policy, if not the belief, of the executive officers of many trades unions, and to this policy the first duties of the citizen to the State have been sacrificed, as was evidenced in the late strike of Arsenal workmen on the pretext that work could not be allowed to be done unless bearing the sign manual of the trades union. On such grounds they did not hesitate, during the rapid approach of the present crisis, to imperil the national weal, by stopping the production of war material. One may safely aver that in no other country could such lamentable suicidal madness be found.



SKETCH OF HORTON AND KIRTLEY BOILER, MIDLAND RAILWAY, 1868.

Mr. Anderson, of Gateshead, whose letter the writer promised to answer more fully long ago, enquired as to certain peculiarities in the construction of the boilers of the Kirtley designed engines, built by Kitson & Co., Leeds, of which brief mention was made in the RAILWAY MAGAZINE, December, 1912, p. 474. The enquiry was as interesting as it was unexpected, inasmuch as the writer had thought that all recollection of them had died out. However, it is a pleasure for him to hark back to so interesting a period, and

Digitized by Google

will, in dealing with the question, confine himself to the method of construction, as he is not quite sure of the measurements. The design of these boilers originated with Mr. George Horton and Mr. W. Kirtley, the former the then foreman boilermaker, and the latter Works Manager at Derby. The object sought after was by dispensing with all angle irons, longitudinal seams, lap, and plated or battened joints, and a considerable percentage of rivets, not only to simplify, but avoid the knuckling action and local stiffnesses of overlaps and double battens, and further to allow the pressure and heat to act on an unbroken circumferential continuity of plate of one thickness, and thus as far as possible practically ensure an indestructible boiler. The barrel consisted of three sections, all of the same diameter, about 4 ft. 1 in. outside. Each section or ring was welded and afterwards faced up in a lathe at the ends where they joined or abutted on the others, so that a close contact was obtained. The three sections or rings were united by a hoop (10 in. by $\frac{5}{8}$ in. in section), shrunk on like a tire on a wheel, and secured by double rivetting of wide pitch. The dome was a difficult piece of boilersmith's work when properly done, combining both dome and hoop, and similarly shrunk on over the middle plate. The end section or ring was flanged (and worked up to a full corner) on which the tube plate was fixed. Of course, the interior of barrel was even, and of the same diameter throughout, thus avoiding the deep pitting and corrosion where differences of diameter exist. To facilitate draining when emptying and washing out, the boiler was given 1 in. higher elevation at the smokebox end. It is unnecessary to remark that the chief difficulty was to ensure sound welding of the sections, and afterwards to anneal them separately to ensure homogeneity. The welds always being the more dense, they were placed above the water line. The shrinking on of the 10 in. hoops required care to avoid excessive constriction. Exceptionally qualified men were required for the welding of domes and sections, and it will be readily understood that though the design was theoretically admirable, the expense was prohibitive.

With the December "Railway Magazine" will be presented a colour plate of one of the new 4-4-0 superheater locomotives for the South Eastern and Chatham Railway, designed by Mr. R. E. L. Maunsell, Chief Mechanical Engineer, and built by Messrs. Beyer, Peacock & Co., Ltd., of Gorton Foundry, Manchester.

Digitized by Google

A Railway Review of the Conquests by Coal.

"WATT and Stephenson whispered in the ear of mankind their secret that a half-ounce of coal will draw two tons a mile, and coal carries coal, by rail and by boat, to make Canada as warm as Calcutta, and with its comforts brings its industrial power." This quotation from Emerson on "The Power of Coal" appears on the title-page of a well printed and profusely illustrated volume entitled "The Magnet of Commerce," recently issued by the Great Central Railway.

Developments which are constantly taking place in the important coalfields of Yorkshire, Nottinghamshire, Derbyshire and elsewhere, and the opening of the new dock at Immingham, provide the Editor's justification for a publication which will periodically give useful information to the coalowner and colliery manager as well as the exporter and the numerous business firms and traders associated with coal and colliery machinery.

Notwithstanding, remarks the writer of this interesting work, all the other means of producing heat, light and power, introduced by modern science, the position of coal as the basis of the world's industries remains practically unshaken, and there are no indications that the day of its supersession is at hand.

Some prophetic souls have hastened to proclaim the advent of the oil age. Oil, no doubt, has made much progress of late years, but the present supply is inadequate, and the pronouncement of the enthusiast is premature. Electricity, as we know, is now being generated by power supplied from waterfalls, and the more imaginative have formulated schemes for the harnessing of the winds and the tides, while it has even been proposed to press into our service the great centre of the solar system itself as a source of power.

What the remote future may bring forth no one can say, but it is obvious that at present the various means either actually employed, or only proposed, for providing our industries with power are mere auxiliaries of, and not substitutes for, coal. In short, this may still be called the coal age, inasmuch as, despite all competition, the production and consumption of coal continue to grow. In 1911, the last year for which anything like complete figures are available, the world's output was no less than 1,187 million metric tons, the value of which is estimated at nearly 435 millions sterling, the quantity showing an increase of nearly 23 million tons, and the value an increase of over 15 millions sterling, as compared with the 1910 totals. It is calculated that the world's output this year will amount to at least 1,200,000,000 English tons.

The United States head the list with an output which in 1912 amounted to no less than 534 million short tons of 2,000 lbs., or about 477 million English tons. The United Kingdom, despite its insignificant size as compared with the vast territories and teeming population of the greatest of the Republics of the New World, comes next with a production of 287 million English tons in 1913. The third on the list is our great commercial rival Germany, which, while importing between 9 and 10 million tons of British coal annually, is producing on a larger scale than ever, her total output for 1913, including lignite, being 278 million metric tons, an increase upon 1912 of 19 million tons.

It is noteworthy that the three greatest manufacturing and trading nations of the globe are also the greatest producers of coal. Indeed, it is not too much to say, perhaps, that the industrial and commercial supremacy of the Anglo-Saxon and Teutonic races is due as much to the possession of ample coal resources as to racial characteristics. In the age of coal, the coalless countries have fallen back in the race. Nature has been particularly gracious to our "right little, tight little" island in this respect. She has dowered us with a bounteous hand, and there can be no doubt that we owe our rise as a commercial and industrial nation to the extent and disposition of our coal measures, as well as to the business abilities and virile qualities of our

Digitized by Google

Digitized by Google

we held in 1911, and in the Netherlands—a sort of back-door to the Fatherland—we have actually lost ground. Exports to Belgium are up by half-a-million tons, as against a decline in 1912 of 200,000 tons. In that year exports to Italy fell by only 40,000 tons, and last year we gained 470,000 tons. Other increases, as compared with 1912, in the European markets are as follows:—Sweden, 450,000 tons; Norway, 100,000 tons; Denmark, 250,000 tons; Portugal, 150,000 tons; Spain, 260,000 tons; Austria-Hungary, 320,000 tons; Greece, 120,000 tons; Egypt, 240,000 tons. It may be remarked that in 1912 our trade with Sweden, Norway, Portugal and Spain actually increased; to Austria-Hungary 230,000 tons less were sent.

As will be seen by the foregoing figures, a large proportion of the coal raised in the United Kingdom is sent from the pit's mouth to some port or other where it is exported to all parts of the world. So far as the Great Central Railway is concerned, no matter whether the port of shipment is on the East, West or South Coast, the facilities afforded enable the traffic to be rail-borne to the port with the utmost despatch.

The remarkable development of the mines of the Coalfields of Yorkshire, Derbyshire, and Nottinghamshire during recent years has resulted in an enormous increase in the coal shipped from the Humber ports. The Great Central Company found that the accommodation provided at Grimsby was inadequate to properly cope with the ever increasing demands made for the shipment of coal, and decided to construct a new dock at Immingham, where coal could be dealt with expeditiously and economically.

The first sod of the Immingham Dock was cut on July 12th, 1906, by Lady Henderson, wife of Sir Alexander Henderson, Bart., M.P., Chairman of the Great Central Railway, and on July 22nd, 1912, the Dock was officially opened by their Majesties the King and Queen. This function at which Sir Sam Fay, the General Manager, was knighted, was illustrated and described in the RAILWAY MAGAZINE, in August, 1912. Situated on the Humber, midway between Grimsby and Hull, Immingham is destined to become one of the largest centres of industry in the United Kingdom. The RAILWAY MAGAZINE for June, 1912, took the form of a special Immingham number.

The Midland Coalfield—the largest in the United Kingdom—where 49,000,000,000 tons of coal are deposited, extends under nearly the whole of North-East Lincolnshire, and year by year the trend of coal production advances nearer to Immingham, where the very latest facilities have been provided for the shipment of coal.

With the opening of new collieries and the increased outputs from the existing pits, it became imperative for the Great Central Railway to build engines of greater haulage capacity for trains of a larger tonnage, with the result that numerous trains of this character are now running practically all over the system, the number of loaded wagons per train averaging 60, 70 and even as many as 80.

It became necessary also to establish a central depôt in South Yorkshire where the wagons of coal coming from all directions could be properly sorted and marshalled into train loads for despatch to destination, and for the distribution of empty wagons to collieries in the vicinity. Wath was decided upon as a suitable central position, and here—as at the new port of Immingham—the force of gravity plays an important part in the movement of wagons to their appointed places.

There are two complete groups of sidings—working quite independently of each other—one group dealing with traffic to the West and the other with traffic to the East. For example, a train of wagons comes in from a neighbouring colliery on the East and is admitted to an empty road, say No. 9—the same mechanical action that sets the points causes a large figure 9 to appear on the signal post. Here the train engine is detached and a yard shunting locomotive moves up to the rear of the train and pushes it up the hump, which is on a rising gradient of 1 in 107. The yardmen are busy uncoupling its several sections and reading the destinations indicated on the wagon sides. Towards the summit of the incline the seven roads and the running road converge and unite in one single line of about 350 ft. in length. This is called the "hump" and the ground slopes away to the West, with a gradient of 1 in 40. The lines diverge again, fanwise, in 30 different roads of varying gradients. As the uncoupled train is propelled up the "hump" the shunter reads the destination of each truck as it passes, and by using a code of whistles advises the man in the adjacent signal-box as to the particular siding into which the wagon must be shunted. When the wagons reach the top of the "hump" they descend by

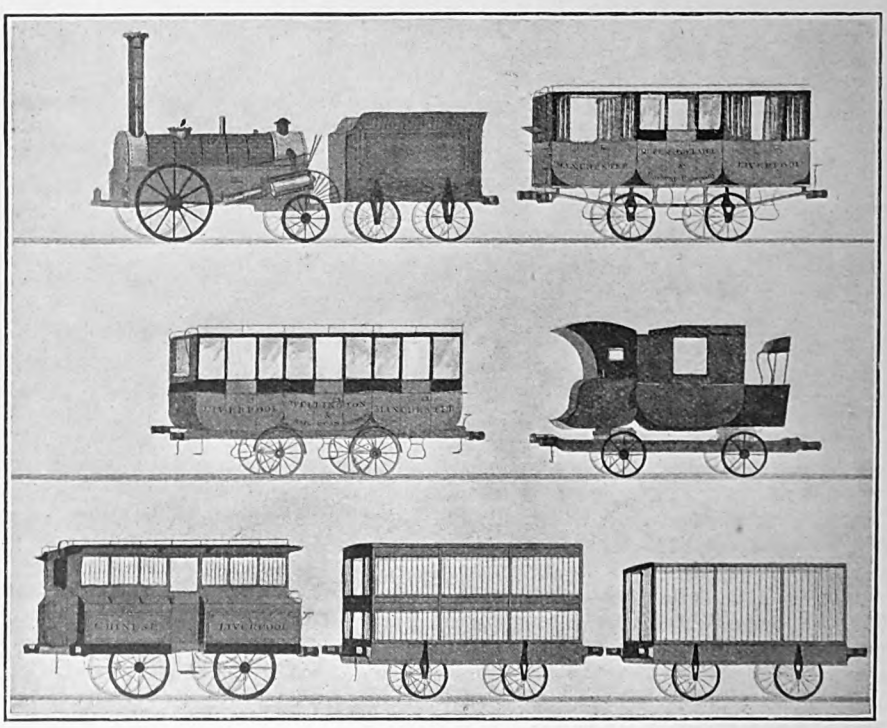
Digitized by Google

gravitation, accompanied by the shunter, until they come to rest in the siding allocated to their particular direction or destination. The accumulated wagons in the sidings are then hauled away by the powerful train engines referred to.

As to the volume of traffic dealt with it may be mentioned that during the six months ending December 31st, 1913, 805,118 wagons were passed through the yard, or a weekly average of 30,966. Assuming that half these are loaded wagons, approximately 154,830 tons of coal are dealt with in the yard weekly.

For further particulars concerning the Great Central Railway and its colliery connections, the reader must be referred to "The Magnet of Commerce" itself. The book, which should be a popular periodical, is published by the Great Central Railway Publicity Department, 216, Marylebone Road, London, N.W.

EARLY ROLLING STOCK USED ON THE LIVERPOOL AND MANCHESTER RAILWAY.



(*From an old print published in* 1831).

No. 1, The *Northumbrian*; Nos. 2, 3, 5, Passenger carriages; No. 4, Private carriage; Nos. 6, 7, Carriages for cattle.

Digitized by Google

AMBULANCE TRAIN: GREAT WESTERN RAILWAY.

Ambulance Trains on British Railways.

No. II.

IN our last issue particulars were given of the hospital or ambulance trains provided by the Great Eastern, Great Central, London and North Western, Midland, and London and South Western Railways. The following is, as far as we can ascertain, a complete list of all such trains in service.

South Eastern and Chatham Railway :—Two trains for the Admiralty, equipped by Mr. R. E. L. Maunsell at an early date, each consisting of eleven vehicles. They were composed of brake vans and brake thirds, fitted with side brackets to carry cots in two tiers, and there were practically no other fittings, except drinking water tanks. No photographs were, unfortunately, taken, as both trains were got together, the fittings all manufactured and erected in forty-eight hours, a notable achievement.

London and North Western Railway :—One train for the Admiralty and three for the War Office.

Great Western Railway :—Two trains.

Great Central Railway :—Two trains.

Midland Railway :—Two trains.

Great Eastern Railway :—One train.

Lancashire and Yorkshire Railway :—One train.

London and South Western Railway :—One train.

Great Southern and Western :—One train.

Great Northern (Ireland) Railway :—One train.

North British Railway :—One train.

Great North of Scotland Railway :—One train.

This makes a total of three trains hurriedly fitted to meet Admiralty requirements, and 14 Military trains specially equipped on a relatively elaborate and ambitious scale, while those of the North British and Great North of Scotland Railways are not quite so pretentious, being adapted more for local requirements.

A few weeks ago the following particulars of the arrangements adopted for dealing with wounded soldiers and sailors returning to this country were given by the Press Bureau: All the hospital ships proceed to Southampton, where there is a special staff for the reception and distribution of the sick and wounded officers and men who are being sent home on them. The arrangements are under the control of a surgeon-general, who holds the appointment of a deputy-director of medical services. He has at his command twelve* ambulance trains specially constructed for the conveyance of four officers and ninety-six men lying down, or for a considerably greater number of patients sitting up. Twice weekly telegrams are received by him from all the larger military and Territorial Force general hospitals, stating the number of beds vacant in each. With this information before him he arranges convoys of sick and wounded on arrival, and despatches them to their destination in one or more of the ambulance trains.

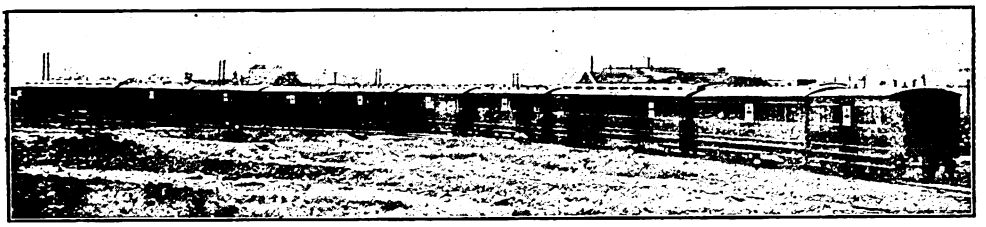
The sick and wounded from overseas have been placed under treatment in the large military or Territorial Force hospital centres. At the railway stations of these localities arrangements are made by the military authorities for conveying sick and wounded in motor or other ambulance vehicles from the railway stations to the hospitals. Voluntary aid detachments have already done useful work in connection with this stage of the movements of the sick and wounded. As the military hospitals get filled up arrangements have been made for transferring sick and wounded from them to various hospitals arranged by voluntary effort.

For dealing with convalescent soldiers and sailors, arrangements are made for sick furlough at various homes. Whenever the convalescent is ready to leave on sick furlough the medical officer sends word to the convalescent home, stating the hour of the man's arrival at the railway station, where arrangements are made to meet and take him over. At the end of their sick furlough the men are required to rejoin the depots of their regiments, in order to be refitted until arrangements are made for their rejoining their units, either in this country or abroad.

* This number is presumably made up of L. & N.W.R., 3; G.W.R., 2; G.C.R., 2; M.R., 2; L. & S.W.R., 1; G.E.R., 1; L. & Y.R., 1; and does not include the three Admiralty trains and those in Scotland and Ireland.

Digitized by Google

Digitized by Google



AMBULANCE TRAIN: GREAT SOUTHERN AND WESTERN RAILWAY.

and Western Railway has placed in service a train which bears comparison on equal terms with those already described. This was completed and equipped at Inchicore Works under the direction of Mr. E. A. Watson, locomotive, carriage and wagon superintendent. The train consists of nine bogie coaches taken from main line traffic and altered to suit the requirements of the War Office. A six-wheeled guard's van is placed at the rear end. Existing fittings and materials were used where practicable, and the whole train was finished in from eight to nine days from the date of the Declaration of War. This remarkable result was achieved not only by means of the large staff employed, but also by the whole-hearted manner in which the men set about the work.

The main part of the train consists of five wards, each fitted with twenty cots in two tiers. These ward cars were converted from standard 50 ft. parcel vans, with the addition of end gangways giving communication with a pharmacy car in the centre. This latter car was also altered from a 50 ft. van, and is sub-divided by means of suitable divisions into a surgery, pharmacy, linen stores, office for medical officers, etc., and provided with the necessary receptacles for drugs, bandages, and nursing utensils and requirements. The surgery is lined all round and on the floor with zinc, the corners being well rounded to assist in cleaning. The various compartments are reached from a corridor wide enough to accommodate a stretcher, a sliding door being provided in the partition to allow a patient to be carried into the treatment-room sideways.

The ward cars have gangway communication with the dining car for the medical, nursing, and ambulance staff. This car was modified from the Company's 66 ft. dining saloon, lavatory and toilet accommodation being added, and seats fitted of a type suitable for the addition of bedding, thus converting the coach into a sleeping car as required. This vehicle communicates with a 52 ft. coach provided with sleeping accommodation at either end for two doctors and two nurses respectively, the central part of the car comprising a pantry and mess room, with one compartment of the original coach unaltered giving further sleeping accommodation for two attendants. At the other end of the train a 66 ft. side-corridor coach is attached to the end ward car. This vehicle is fitted out as a stores car, and has accommodation for six attendants.

All the carriages were thoroughly cleaned inside and outside and disinfected. They were then overhauled, painted white and varnished inside. Special attention was given to the ventilation and lighting, and ample lavatory and sanitary provision, with large capacity overhead water tanks on each car. Steam-heating and electric bells are provided throughout the train, the total length of which, including a 30 ft. guard's van at the rear, is 550 ft.

The North British Railway Company's train is not quite so pretentious as others described, its purpose being rather different, but it is equally interesting. It consists of seven vehicles, all fitted with standard vestibules, electric light, and steam heating. The Royal Army Medical Corps provided the staff and beds.

The first coach is a brake composite, 61 ft. 2⅞ in. long over buffers. The end compartment is utilised for the guard, while the next two compartments are reserved for the staff. The remaining space has two double doors and one single door on each side, part of the interior being fitted with shelves and seats, while the remainder accommodates five beds. The second and third vehicles are big 52 ft. 7 in. brake vans, with two double doors on each side and two single ones in the centre, with the usual "Ogees" between, providing two seats, the remaining space accommodating ten beds in each case.

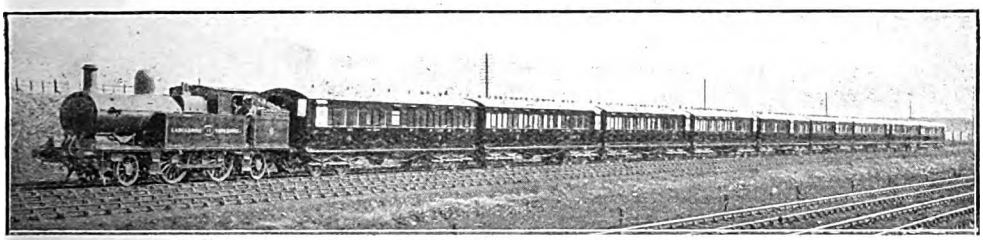
Next is a 40-ton twelve-wheeled dining carriage, 68 ft. 11§ in. over buffers, the original accommodation of two first-class compartments, four thirds, kitchen, pantry and lavatories being retained with little alteration. The fifth and sixth vehicles are similar to the second and third, while the seventh corresponds to the first in reverse.

The Lancashire and Yorkshire ambulance train is composed of nine bogie carriages, having a total length of 471 ft. 3 in. over buffers, the selected vehicles being taken from service, and equipped as an ambulance train for conveying wounded soldiers to hospitals in various parts of the country; the train has, therefore, been made suitable to travel over all the main railway lines of Great Britain.

Berth accommodation is provided for four officers and ninety-six men in the five ward cars arranged on either side of a pharmacy car in the centre of the train; these wards are lettered A, B, C, D and E, and the berths numbered consecutively to facilitate reference to the patients as is done in ordinary hospitals. Each ward is

Digitized by Google

Digitized by Google



AMBULANCE TRAIN: LANCASHIRE AND YORKSHIRE RAILWAY.

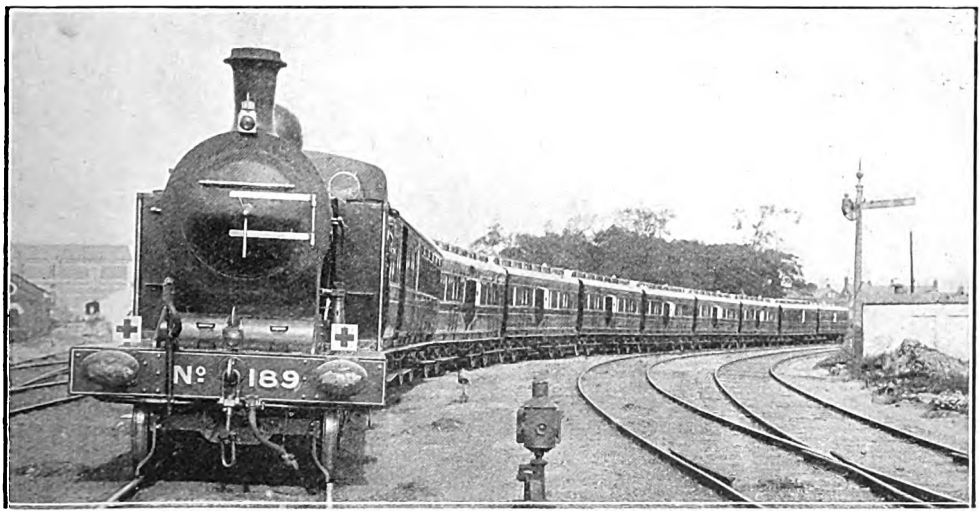
(6), (7) and (8) 48 ft. hospital wards (each ward accommodates twenty men); (5) 48 ft. pharmacy car (pharmacy, treatment room, office, clean linen and soiled linen); (9) 56 ft. R.A.M.C. staff car (sleeping accommodation for twelve men and stores).

The medical staff car provides sleeping accommodation for two medical officers, mess room for two medical officers and two nurses, pantry, brake compartment, and two lavatories. No. 2 has accommodation for dining twenty-four men. The tables are removable so that beds can be made up for sleeping eight men. The kitchen is provided with cooking range, hot and cold water, and all necessary utensils for cooking and washing up, with pantry and provision stores.

In No. 3 the officer's portion is partitioned off and fitted with sliding doors. Each of the other ward cars accommodates twenty men, and all are fitted up with cots of the folding-up type, arranged in upper and lower berths, five upper and five lower, at each side. Wash-hand basins, mirrors, folding tables and electric light on sides are provided at the lavatory end. The lavatories in each ward are of a special type for sterilising excreta before passing to the permanent way.

The pharmacy car provides a pharmacy fitted up with cupboards, shelves, sink, hot and cold water. The treatment room is provided with large sliding door to allow of a stretcher being brought in from either end of the train. The floor is covered with lead, and all corners rounded off to ensure cleanliness. The sides and ends are zinc covered to a height of 3 ft. The water tanks have a capacity of 95 gallons each. An office is provided for the officer in charge of the train. The clean and soiled linen stores are zinc lined and fitted with the necessary shelving. No. 9 provides sleeping accommodation for twelve men and stores for men's kits, with two sitting compartments. It is provided with a hand brake.

The whole of the train is electrically lighted, with switches arranged so that the lights can be used either full or half. The treatment room and office are provided with movable lamps; all the roof lamps in the wards are provided with screens so arranged that either side of the ward may be screened. The train is efficiently heated by steam from the locomotive, and thermometers are provided so that the temperature can be regulated to suit medical requirements. All the wards and pharmacy car have clerestory roofs, and are provided with ventilators, which are controlled from the inside. The whole of the interiors of these cars are finished in white enamel, and the floors laid with linoleum. All cars are connected by gangways, and portable fire extinguishers are provided in each vehicle.



AMBULANCE TRAIN: GREAT NORTHERN RAILWAY OF IRELAND.

Digitized by Google

Official Changes in the Home Railway World.

LAST year we announced that in view of the then impending retirement of Sir Frank Ree, Mr. Guy Calthrop, General Manager of the Buenos Ayres and Pacific Railway, had been appointed as his successor. Mr. Calthrop was not able to leave South America at the time and as a result of the sudden death of Sir Frank Ree, Sir Robert Turnbull has for some months been General Manager of the "Premier" railway. Events have moved rapidly, Sir Robert Turnbull being appointed to the Executive Committee by whom the railways are being administered on behalf of the Government. Mr. Guy Calthrop returned to England several months ago, and has, no doubt, rendered valuable assistance during this period of difficulty, and has now taken up his appointment as chief executive officer at Euston. Sir Robert Turnbull, having ceased to act as General Manager of the London and North Western Railway as from October, has resigned his position on the Railway Executive Committee, and has been succeeded on that Committee by Mr. Guy Calthrop, the new General Manager.

Proof time-tables issued by the London and North Western Railway, in anticipation of the October train alterations, gave the first intimation as to the date of the change, as they included the following special notice:—

> During the continuance of the war the passenger and goods train, and steamboat services, may have to be curtailed or varied as circumstances require without previous notice. The London and North Western Company therefore give notice that responsibility will not be accepted for any loss, damage, or delay, in consequence of any curtailment or interruption of the ordinary services.
>
> GUY CALTHROP, General Manager.

As far back as June of last year it was announced that the directors had selected Mr. Calthrop to succeed Sir Frank Ree on his expected retirement in June of this year. Sir Frank Ree's death on February 17th, however, created an unexpected vacancy, and Sir Robert Turnbull, the Superintendent of the Line, was appointed. At a meeting of the London and North Western Railway Company, on February 28th, the Chairman, Sir Gilbert Claughton, referred to the lamented death of Sir Frank Ree, and explained that Sir Robert Turnbull was invited to succeed to the position on his retirement. Sir Robert then preferred to adhere to his decision to retire during 1914, but under the circumstances he had now placed himself at the disposal of the board, and would take up the full position and title of General Manager until Mr. Calthrop returned to England. At the same meeting, on February 28th, Sir Gilbert Claughton spoke of the prospective appointment of Mr. Calthrop, remarking that he was a man of marked ability, whose career had been watched by the intelligence department of their system. He had received the testimony of more than one that Mr. Calthrop would be the right man in the right place.

Mr. Calthrop, who is still in the early 'forties, is probably the youngest man to occupy so exalted and honoured a position. Born at Uppingham, in Rutland, Mr. Calthrop began his railway career in 1886, in the traffic department of the London and North Western Railway. He remained for six years in the office of the Superintendent of the Line, and in 1892 was appointed one of the Superintendent's outdoor assistants. In 1902 Mr. Calthrop became General Superintendent of the Caledonian Railway, and in 1908 succeeded to the post of General Manager of that line. In 1910 he left England to become the General Manager of the Buenos Ayres and Pacific Railway. His wide experience in different parts of the world should stand him in good stead, for, in addition to his work in Buenos Ayres, he has studied extensively the railway problems of Canada and the United States.

It is doubtful whether there is any more popular officer on the London and North Western Railway than Sir Robert Turnbull, and his retirement, well-earned though it is, removes a personality which counted for much in the affairs of the "premier" railway. It is an open secret that the appointment which Sir Robert has held perforce during the last few months was offered to him, and that it was only because he felt that his busy railway life justified retirement from active service that he did not take the position. In the emergency, however, his administrative capabilities were placed at the disposal of the Directors, and in the event Sir Robert has also taken his share of special responsibility as a member of the Railway Executive Committee by whom our railways are being administered on behalf of the Government.

Sir Robert Turnbull's first appointment was to the position of Assistant District Superintendent at Liverpool, under Mr. James Shaw, then Superintendent of the northern division of the London and North Western Railway. After acting as Mr. Shaw's assistant, from March 1st, 1877, to March 31st, 1885, he removed from Liverpool to London, to take up the position of

Digitized by Google

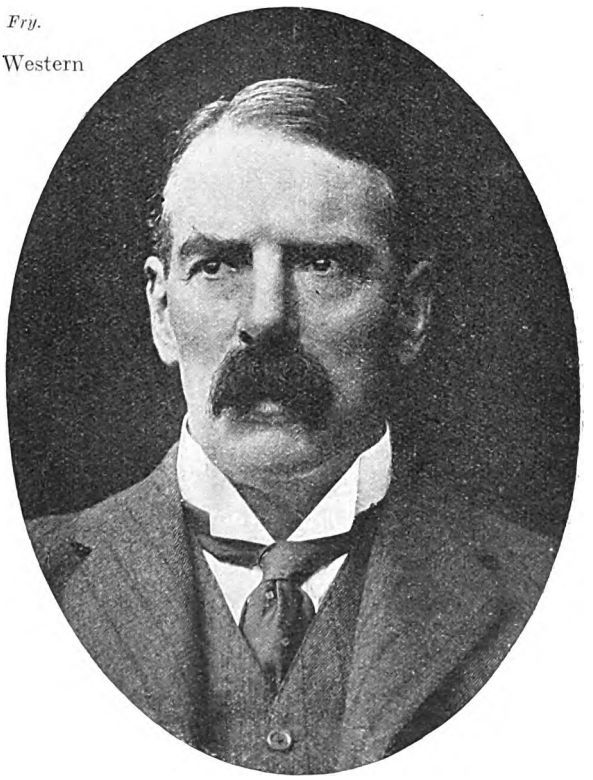
Photo] [*Elliott & Fry.*

MR. GUY CALTHROP,
General Manager: London and North Western Railway.

Assistant District Superintendent of the southern division of the North Western system. Exactly two years later, on April 1st, 1887, he became Assistant Superintendent of the Line, and eight years later, on August 1st, 1895, he was appointed to his best-known position, that of Superintendent of the Line. In 1900, Mr. Turnbull acted as Chairman of the Superintendents' Conference of the Railway Clearing House, and he was again elected to that position for 1911. In April, 1913, he received the honour of knighthood from His Majesty.

We regret to announce the death of Mr. W. H. Hills, Superintendent of the Line, Great Northern Railway. Mr. Hills joined the Great Northern Railway in 1871; two years later he was promoted to the office of the late Mr. Cockshott, Superintendent of the Line; and in 1876 he was made Chief Clerk to the London District Superintendent. In 1878, he was appointed Relief Clerk for the same district, which position he held until 1884, when he returned to the office of the Superintendent of the Line to take up a responsible position in the Time Table and Excursion Department. In 1889, the Great Northern Railway took over its own advertising, and Mr. Hills was placed in charge of the new department. This position he held until 1894, when he was made Rolling Stock Controller, and in 1896 (on the retirement of Mr. Cockshott and the appointment of Mr. Alexander as Superintendent of the Line), he was made District Superintendent from London to Peterboro'. On the Great Northern Railway staff reorganisation, which took place in 1902, Mr. Hills was appointed Superintendent of the Running Department, in which capacity he had charge of the whole of the traffic-working on the Great Northern system. On the retirement of Mr. John Proud, General Superintendent, at the commencement of 1911, Mr. Hills was made Superintendent of the Line, combining the duties of the General Superintendent, Running Superintendent, and Chief Passenger Agent. Mr. Hills has on several occasions been the recipient of Royal favours, including a diamond pin from His Majesty the present King, when Prince of Wales, and also one from the late King Edward VII.

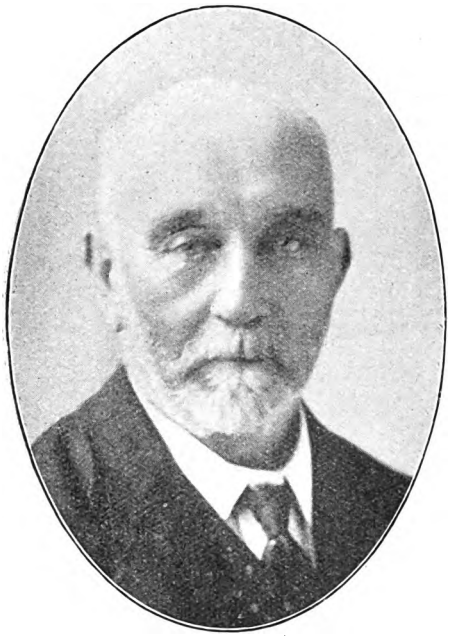
Further important staff changes, necessitated by the retirement, after long service, of the Joint Collectors at the Bute Docks (Messrs. Henry Lander and David Edmunds) are announced by the Cardiff Railway Co. To the



Photo] [*L. & N. W. R.*

SIR ROBERT TURNBULL,
Late General Manager: London and North Western Railway.

Digitized by Google



MR. HENRY LANDER.

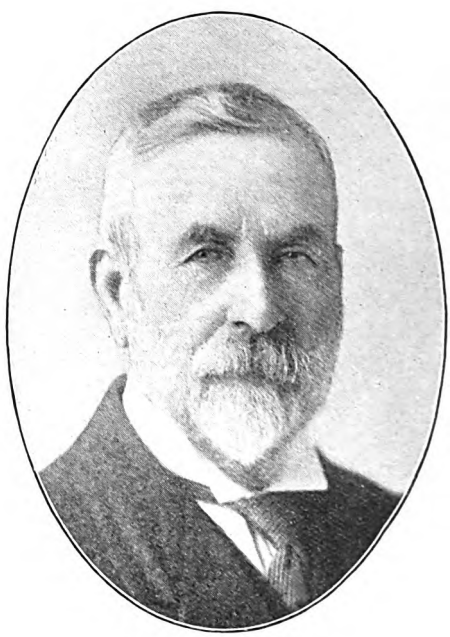
office vacated by Messrs. Lander and Edmunds, Mr. W. H. Treatt, Chief Clerk in the Collectors' Department, has been appointed, and the changes took place at the end of September.

Mr. Henry Lander, Senior Joint Collector, was born at Burton, Christchurch, Hants, in 1847, and educated at Christchurch private school. He entered as junior clerk in the Collector's Department of the Bute Docks in 1866, under the late Mr. Thomas Collingdon, and was appointed senior Joint Collector of the Bute Docks by the Trustees of the Marquis of Bute in May, 1881. Although his official position was that of Collector of Rates and Dues, a great deal of his time has been devoted to statistical work. He has had a long experience of Parliamentary enquiries and has given a great deal of statistical and expert evidence before Parliamentary Committees, his first experience being the Bute Docks Bill, 1882. In the course of his long service Mr. Lander has seen many changes in the control and management of the Bute Docks. He also has witnessed and assisted in the phenomenal growth of trade at these docks. In the year 1866 sailing vessels provided 84 per cent. of the whole tonnage using the Bute Docks, whereas in the year 1913 it had fallen to 4 per cent. of the whole; while the Imports and Exports of the Bute Docks increased from 2,876,803 tons in the year 1866 to 13,676,941 tons in the year 1913.

During the past few years Mr. Lander's health has been failing, and the Marquis of Bute and the Directors of the Cardiff Railway Company generously assented to his wish to retire at the end of September, and took the exceptional course of allowing him to do so on his full salary. The Directors have also inscribed on their minutes a special resolution expressing their appreciation of Mr. Lander's long and faithful services, and a copy has been handed to Mr. Lander with a sympathetic letter signed by the General Manager, Mr. C. S. Denniss.

Mr. D. Edmunds, Joint Collector, was born at Aberdare in 1848, and joined the Bute Estate Office at the Mardy under the late Lord Merthyr (then Mr. W. T. Lewis), in 1868, and worked with him at the same desk for about six years. He was engaged there for nearly 15 years, during which time he had amongst other duties the collection of Lord Bute's Royalties at the various collieries on the estate and spent a good deal of time in London with Lord Merthyr on Parliamentary Bills and Royal Commission work. In 1883 Mr. Edmunds was appointed Superintendent of Stores at the Bute Docks, and three years later was made Joint Collector of Dock Dues with Mr. H. Lander.

Mr. Edmunds has been a successful essayist at the Welsh National Eisteddfod on several occasions; he has written histories of the South Wales Coalfields and of the Coal Trade of the Rhondda Valleys. He is the author of a very useful handbook on Friendly Societies. His favourite hobby is farming.



MR. DAVID EDMUNDS.

Digitized by Google

MR. WILLIAM H. TREATT.

Mr. William Herbert Treatt, who has been appointed Collector of Dues, etc., is fourth son of the late John Burford Treatt, a well-known old Cardiff resident. He commenced work in the Coal Shipping Department of the Bute Docks in September, 1874, and in 1881, was transferred to the Collectors' Department, where he rose to the position of Chief Clerk and now takes the head of the Department.

In his younger days he served in the old 10th Glamorgan Rifle Volunteers, and was a useful shot. He will be remembered as an all-round athlete, and one of the founders, and, for a number of years, Honorary Secretary, of Cardiff Football Club (Rugby). He was also for many years one of the Welsh Football Union Committee.

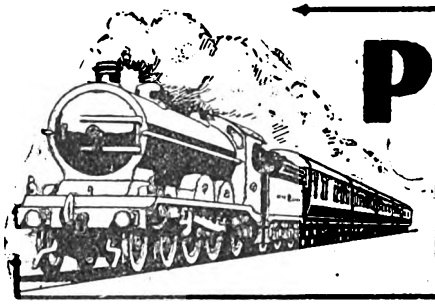
New London & North Western Railway Officers.

FOLLOWING the retirement of Sir Robert Turnbull, the Directors of the London and North Western Railway Company have appointed Mr. Launcelot Worthy Horne, Assistant to the Superintendent of the Line, to the position of Superintendent. Mr. Horne was born in 1875, and in 1893 entered the Company's service, first in the General Manager's Office, and then under the Superintendent of the Line. In 1901 he was given charge of the colliery district at Springs Branch, Wigan. In 1902 he became Assistant Superintendent for the North Eastern division, and in 1905 he was appointed District Traffic Superintendent for the Chester and Holyhead section. In March, 1908, he was transferred to Birmingham in charge of the passenger working. In June, 1910, he was appointed London District Superintendent, and in 1911 Assistant to the Superintendent of the Line.

Mr. W. M. Turnbull, who has hitherto had charge of the Northern Division, with headquarters at Lime Street station, Liverpool, becomes Assistant Superintendent of the Line. In the September RAILWAY MAGAZINE we gave his portrait and particulars of his official career. He commenced in the District Goods Managers' Office at Rugby, where he went through all departments. He was then sent to Atherstone station, dealing with goods traffic, afterwards returning to Rugby for a time. He was then sent to Coventry as a canvasser, eventually being appointed District canvasser. In due course Mr. Turnbull was removed to the Traffic Superintendent's office at Chester, staying there for about two years, afterwards going to Lime Street, Liverpool, as Time Table Clerk under the late Mr. James Shaw. A year or so later a vacancy for an assistant to Mr. Shaw occurred, and Mr. Turnbull was appointed, occupying this position for two years. His next appointment was at Birmingham, as assistant to Mr. Entwistle, and when the latter gentleman was removed to Chester Mr. Turnbull became Superintendent at Birmingham, remaining there until appointed to take charge of the Northern Division.

Mr. E. C. Grindley, who becomes Indoor Assistant to the Superintendent of the Line, has been for many years in the Superintendent's department, and has had a varied experience in its important operations. He has taken a prominent part in bringing the Company's Temperance Society up to its present high standard, and in other work for the welfare of the staff.

Digitized by Google



PERTINENT PARAGRAPHS

British Railways and the War.

So far there have been no special changes to chronicle as regards the railway situation under war conditions. There have been no untoward developments, and even the temporary closing of particular sections has almost ceased, except in a few specific instances where traffic is definitely discontinued for a time. Indeed, the situation is so nearly normal that were it not for other factors, one can hardly realise that the United Kingdom is actively concerned in the greatest war in the world's history; certainly the railways give little indication of any special circumstances as they "pursue the even tenor of their way," to quote an engineering contemporary. There is, however, one important development, that excursion and tourist facilities—usually by ordinary trains—are to be continued until the end of November, except as regards Scotland and Ireland. Otherwise matters are nearly as they would have been under more prosperous conditions; "luggage in advance" arrangements are now again in force, where they had been discontinued, wholly or partially; and virtually all excursion and similar arrangements are now available as far as they are required, including week-end, period excursion, tourist, day and half-day trips, walking and cycling tours and rambles, and other standard facilities. It is, in fact, only in respect of the Continental services that present conditions suggest in any degree that circumstances are in reality abnormal; and there is no indication that by the date we go to press the situation will undergo any material change, unless it becomes necessary to introduce more stringent regulations affecting the general public, in which event railway arrangements will be necessarily involved in consequence.

* * *

October Time-tables.

It was to be expected that even under existing conditions there would be special indications in the time-tables which usually come into force in October; but on most lines even the enforced alteration of the Continental services is ignored. The South Eastern and Chatham time-tables include all the usual Continental services and notices as to the running of pullman cars; but these are in some cases printed over in red with the intimation: "At the time of going to press it is not possible to publish particulars of boat train services to be in operation for the period covered by this time-book, and intending passengers are, therefore, recommended to consult the special notices, time-tables, etc., which will be issued in connection with the Continental services." Therefore, in the actual time-tables all the usual services are shown as in operation, with a notice appended to each to the effect that "This train is liable to alteration or withdrawal; intending passengers should consult the special notices of the Continental services."

On some lines there are not even safeguarding notes of this class, presumably on the ground that they are provided for by the general intimation as to special services in operation and the war conditions, while the public time-tables themselves have to do duty until next spring, by which date it is to be hoped the temporary difficulties will be over.

In the case of the Great Eastern Railway we have, in addition, the entire revision of the main line and branch services, as reviewed in detail in a special article on another page.

Although most of the railway timetables appear with little indication of special conditions, except for a leaflet or general notice to the effect that train and steamer services may be altered while the present situation prevails, the cover of the Great Central timetables for October has imprinted across the standing announcements of the Continental services the words "Cancelled during the War"; the same practice being also adopted on interior pages as required.

We regret to notice in the case of the London and North Western Railway, for the time being at any rate, the typewriting compartments have disappeared from the 8.20 a.m. Birmingham to Broad Street, 8.40 a.m. Birmingham to Euston, and the 4.45 and 5.50 p.m. trains from Euston to Birmingham.

On Monday, October 5th, "The Southern Belle" resumed its regular services between Victoria and Brighton.

* * *

Continental Traffic Arrangements.

These have, perforce, suffered variation at various dates since last we dealt with them. The London and South Western Railway commenced a steamer service between Southampton and St. Nazaire, on Mondays, Wednesdays and Fridays leaving Southampton Docks about 3 p.m., after the arrival of the 12.30 p.m. from Waterloo, and returning from St. Nazaire on the same days

Digitized by Google

about noon. This was soon suspended for passengers to Brittany, Bordeaux, etc., but a service to St. Malo was operated every Wednesday and Saturday for Normandy and Paris, and the Havre service by the 10.30 p.m. from Waterloo each night.

Later the arrangements became as follows: For the re-opening of the Cherbourg route, the departures during October were by the 11.40 a.m. from Waterloo on Mondays and Thursdays, leaving Southampton about 3 p.m. During November and December the train will leave Waterloo at 10.15 a.m., the boat leaving Southampton earlier. The St. Malo service was also rearranged, with departures from Waterloo by the 10.35, 11.40 or 12.30 trains according to date.

The Great Eastern Railway cancelled the temporary Harwich-Antwerp service, in place of one from Tilbury—presumably owing to the mining of a portion of the North Sea by our own naval authorities—steamers leaving Tilbury and Antwerp at daylight daily. For the outward journey only British subjects were conveyed, holding a British foreign office passport. Returning arrangements had to be made with the Company's Antwerp agent. This has been, since the fall of Antwerp, necessarily discontinued.

The London, Brighton and South Coast Railway continued running the following services to and from Dieppe and Paris *viâ* Folkestone: London to Dieppe and Paris (Tuesdays, Thursdays and Saturdays) leaving Victoria at 10 a.m. Paris and Dieppe to London (Mondays, Wednesdays and Fridays).—Paris-St. Lazare, dep. 8 a.m.; Victoria, arr. 8.2 p.m. Later this became a daily service. No guarantee was given as to communication on the French side, but in addition to the trains between Dieppe and Paris, several services were running beyond in various directions; also between Dieppe, Rouen, Havre, etc. Single-journey tickets, first and second class, could also be taken in advance for all stations on the French State, Paris, Lyons and Mediterranean, Orleans, and Midi Railways, for which fares are in force; also for Switzerland and Italy *viâ* the Paris, Lyons and Mediterranean, and to Spain *viâ* Irun or Port Bou. No guarantee, however, was given as to services, and passengers had in all cases to find their own way across Paris. German, Austrian, and Hungarian subjects were not allowed to travel by these services.

Through tickets continued to be issued by the South Eastern and Chatham Railway to all stations south of Paris; also to Switzerland, Italy, Spain, Portugal, and all parts of Holland, at passengers' risk. The services were *viâ* Folkestone, with daily crossings to Boulogne, for Paris, that route being again available, the train leaving Charing Cross at 8.30 a.m.; to Flushing, at the same time; to Ostend from Victoria, at 10 a.m.; to Calais, for Paris, daily, from Charing Cross, at 2.5 p.m. There were three or four train services running daily between Calais and other towns. Later the Ostend boats necessarily ceased their usual services.

Other Special Developments.

FROM October 1st the Metropolitan District, London Electric, Central London, and City and South London Railways withdrew their general permit for soldiers and sailors to travel without obtaining Government warrants. This arrangement had, by that time, become unnecessary, the warrants being then easily procurable. But all members of the Naval and Military Forces (including men serving with recognised ambulance corps attached to the Army and Navy) when on leave are permitted to travel at the single fare for the double journey between the stations where they are quartered during the war and their homes, on surrender of a proper voucher issued by a commanding officer.

In consequence of the Government request that as far as possible brilliant lighting of thoroughfares and buildings should be discontinued to facilitate airship observations by night over London, the lighting at many of the large stations was considerably reduced. In a few cases the glazed roofing was partially shaded, but the ordinary method was to discontinue the use of the large arc lamps provided for general illumination, depending mainly upon the smaller lights along the platforms and about the circulating areas.

London and North Western 4–6–0 ("Experiment" class) passenger engine *Germanic* is now running with the name *Belgic* affixed above the old name-plates on the driving-wheel splashers, the old name *Germanic* appearing with two red lines drawn across.

An interesting change, obviously the direct result of the present international conflict, has been made by the Great Western Railway Company in the name of one of their four-cylinder express passenger engines of the "Knight" class, No. 4017. When first put into service in 1908, this engine bore the name *Knight of the Black Eagle*, but this particular order of knighthood is Prussian in origin, so a change has now been made, and No. 4017 has been re-christened *Knight of Liège*—a fitting tribute to the heroism of our Belgian allies. This is not the first time that an alteration in the name of a Great Western locomotive has been dictated by special considerations. In the "nineties," when some doubt began to be cast on the entertaining "traveller's tales" of Mons. Louis de Rougemont, No. 3022, *Rougemont*, one of the 7ft. 8 in. "single" express engines of the Company, was re-named *Bessemer*. In this case, however, No. 3022 had borne her original name long before Mons. de Rougemont attained notoriety.

Besides carrying on their usual activities, usually with an appreciably depleted staff, owing to the large numbers who have joined the colours, the various railway works are doing a considerable amount of work to meet military requirements, in the way of equipping road and rail vehicles to suit service needs, making stretchers and in other ways meeting national demands.

We understand that a few vehicles from some of the hospital trains are being shipped across

Digitized by Google

to France, where additional equipment for dealing with wounded soldiers is urgently required.

The North Eastern Railway has made comprehensive arrangements for dealing with the transport of wounded soldiers returned from the front. A number of 15 and 20-ton covered goods wagons have been converted into ambulance trains. In addition, a number of what are called "rest vans" have been provided for the use of soldiers who may be unwell when travelling in a troop transport train.

AMONG promotions in, and appointments to, the Order of the Hospital of St. John of Jerusalem in England, graciously sanctioned by His Majesty the King, may be noted the following: Sir Alexander Henderson, Bart., M.P., and Sir Sam Fay.

* * *

Railway Steamers and the War.

THE September Navy List shows that three cross-Channel boats, which usually fly the flag of the South Eastern and Chatham Railway Company, now have the White Ensign at their mastheads.

In a letter received by Captain Barwick, Marine Superintendent at Grimsby Great Central Railway, Captain Stephens, of the Great Central Railway Company's steamer *City of Bradford*, interned at Hamburg with the crews and ships of the *City of Leeds* and *Bury*, stated that he was writing on behalf of the whole of the officers and crews, who are in good health, are well provisioned, and have received courteous treatment from the German authorities. Although there are several German ships and crews in the harbour, there has been no evidence of ill-will towards the English prisoners, who, however, are detained on board their own ships and are not allowed to go ashore. He added that the cold weather had set in, and the crews would appreciate some warmer clothing. In response to the request, Captain Barwick arranged to forward a supply of clothing by steamer sailing for Rotterdam. A supply of garments from the Lincolnshire Needlework Guild and the Women's Emergency Corps at Grimsby was also sent.

Referring to these steamers, it is of interest to note that according to the Government booklet "Great Britain and the European Crisis," on August 1st, Sir Edward Grey instructed the British Ambassador in in Berlin to enquire as to why the Great Central vessels were detained at Hamburg, and then, after promises of release, they were held on various pleas until war conditions commenced on August 4th.

Several of the Great Western turbine steamers constructed for the Fishguard and Rosslare service are now being utilised in the national interest. The usual appearance of the vessels have been entirely changed, the black hull having been converted into one of white with a broad green band from stem to stern, intersected amidships by the "Red Cross" on a white ground.

Railwaymen with the Colours.

IN the September RAILWAY MAGAZINE we estimated that at least 20,000 railwaymen had joined the colours, a figure which has been quoted very widely on the basis of our statement at that relatively early period of the War. Last month our figures were raised to from 20,000 to 30,000; but on the basis of information which is now becoming available, it appears that 55,000 would be a safe estimate, and it becomes easy to appreciate why the railway companies have had to place a check upon the too-enthusiastic recruiting of their employés in the interests of national transport. Several of the big lines have provided from 6,000 to nearly 10,000 men, the Great Western acknowledging 7,600, the London and North Western upwards of 9,400, Midland 6,700, North Eastern 5,000, Underground combination 4,500, and on several other lines figures are well over 2,000.

* * *

Military Movements on the Great Eastern Railway.

FROM August 5th to September 14th the Great Eastern Railway operated 870 military trains, and approximately 20,000 vehicles were in use for military purposes. The work of the Company has not been confined to military trains; the electrical staff are supplying power here or 'phones there; the marine shops are doing naval repairs, etc.; clerks are acting as special constables; men are engaged painting the tops of outside lamps black; stretchers are being made; wagons are being altered to suit Army road purposes; and new road vehicles are being constructed. Newmarket Old Station became a temporary bathing place; the military authorities commandeered some wagon sheets which were secured by the corners to the iron posts of the covered way and then filled with water. The Continental steamers provided an increased service of cargo boats to bring over food-stuffs from Holland. The service with Antwerp not only brought over goods which English firms had warehoused in Belgium but in part counteracted the German scare efforts, for it gave confidence to Antwerp people to find in their dark hour the familiar "Harwich Boat" once more alongside their quay. The Consul-General for Belgium has expressed the pleasure which this service gave the British colony, who, by the way, are busy furnishing a Red Cross hospital. Those on the first steamer of the Tilbury service witnessed a Zeppelin raid over Antwerp as they left the town.

* * *

Trade Unions and the War.

CONFERENCES between the representatives of the National Union of Railwaymen and the railway companies were suspended during the months of August and September in accordance with the common agreement that no meetings between the parties should take place during the general holiday months. The negotiators met again on October 1st, and having regard

Digitized by Google

to the position in the country, and more particularly to the urgent calls upon the managerial staffs, the following temporary agreement was announced:—

"Sir Guy Granet referred to the suggestion which has been made as to the desirability at this stage of introducing the proposed new Conciliation Board machinery, and, under the circumstances, it was resolved that notwithstanding the notice of determination which expires on November 30th, 1914, the scheme of conciliation settled at the Board of Trade conference on December 11th, 1911, shall remain in force, and that the men's sides of the boards on each of the several railways as at present constituted shall continue to act, provided that either the railway companies, the National Union of Railwaymen, or the Associated Society of Locomotive Engineers and Firemen may give six weeks' notice to determine the agreement, and thereupon the parties hereto shall agree as to the arrangements to be adopted for the future.

"It was further agreed that all existing contracts and conditions of service shall remain in operation, and that no new agreements shall be made by the companies either with deputations or Conciliation Boards during this suspensory period.

"(Signed) For General Managers' Committee:—
W. Guy Granet.
W. Clower.
For N.U.R.:—
A. Bellamy.
J. E. Williams.
For A.S.L.E. & F.:—
G. Wride.
G. Moore."

The secretary of the National Transport Workers' Federation has received a letter from the Admiralty requesting him to convey to all the workers who helped in the preparation, coaling, fitting, and loading of the transports engaged in the conveyance of the Expeditionary Force their high appreciation of the rapid and efficient manner in which the work was carried out. Without this cordial co-operation on the part of the workers, it would have been impossible to conduct the operations within the time prescribed, a matter which was of vital importance.

* * *

British Railway Trade and the War.

With commendable enterprise the Board of Trade has issued a series of bulletins dealing with various branches of industry, and those relating to trade in railway material contain several items of interest which may be briefly referred to. The bulletin on railway locomotives is specially interesting, as it gives German exports both for 1912 and 1913, and shows how remarkably her trade in this industry was expanding, the total for the earlier year having been £1,857,500, and for 1913 no less than £2,712,100. Our own exports for the years 1912 and 1913 were £2,137,200 and £2,781,911 respectively, so that last year Germany was practically level with us. Exports from Germany to Denmark, Spain, and Russia in 1913 were approximately, double those of 1912, but whereas in the first half of 1914 the exports to the two first-named countries had dwindled to insignificance, those to Russia were more than maintained at the level of 1913. Exports to the Netherlands and to the Dutch East Indies have been well maintained, but in most other cases, particularly to France, Italy, Servia, Roumania, Turkey, Japan, Korea, Brazil, Argentina, and Chile, they have shown a decided decline, presumably due to the completion of orders. The exports of locomotives without tenders in 1913 were, roughly, two-and-a-half times as great as in 1912. The bulk of the increase took place in the exports to Spain, Turkey, Argentina, and Brazil. Exports to France were smaller. In the first half of 1914 exports to France, Spain, Italy, and Brazil showed a large falling off, while those to Turkey and Argentina were fairly well maintained. The United Kingdom holds an overwhelmingly strong position in India and Argentina. British manufacturers have also been doing fairly well in the Netherlands, but elsewhere there appear to be great opportunities for obtaining new and valuable business hitherto done by Germany, especially in view of the recent cancellations of contracts held by German firms, which, under present conditions, they are unable to fulfil. Germany has been, in fact, a very keen rival of the United Kingdom in the building of locomotives, and has made considerable progress in the last few years. In public contracts abroad, German firms have been able by reason of cheaper labour and lower cost of materials to quote in many cases prices appreciably lower than those of their British competitors.

* * *

Competition for Locomotive Orders.

Considerable information is given as to individual orders for locomotives and railway material. In several instances orders obtained by German firms have been given out by Government departments, as in British South Africa. Details are given of tendered prices, ranging from £4,950 per engine, quoted by a German firm, to £7,190 per engine, quoted by a British firm, the lowest here being £6,515. Actually the tender of a German firm at £5,162, increased to £5,262 in view of amendments to the specification, was accepted. It was admitted that British workmanship and material would be better, but a saving of £13,350 on ten engines could not be ignored, and, speaking generally, there is no suggestion that the German firms gave inferior workmanship and material. In fact, it is particularly notable that there are no serious criticisms of the German products, and it is difficult to avoid any other conclusion than that the German firms have either been able to quote exceptional figures because of their favourable manufacturing situation, or that to do so has been a settled

Digitized by Google

policy of the nation with a view to ultimate benefit. Whatever the explanation may be, there is certainly a great opportunity for improving the home market, and the temporary cessation of German export industry must be fully taken advantage of.

* * *

L. & N.W.R. "Roll of Honour."

In one of the headquarters offices at Euston there is displayed in a prominent position a "Roll of Honour," containing the names of members of the London and North Western Railway staff at the front, together with their corps, rank, and the latest news of their whereabouts. The idea seems a particularly good one and one that, we think, might with advantage be copied. Another feature of the Roll is a column wherein the names of all those whose services have not yet been accepted by the Government are inscribed, together with the names of those who have offered themselves for enlistment but have failed to pass the necessary examination.

* * *

British Railwaymen for France.

On behalf of the Railway Executive Committee, Lieut.-Colonel Forbes, General Manager, London, Brighton and South Coast Railway, is recruiting from the staffs and employés of the various railway companies troops to assist in restoring and maintaining railway communications for the armies in the Western campaign. There are three companies, composed of permanent-way men, linemen, telegraphists, and other similar sections. Another company is being raised from contractors' men, such as riggers, timbermen, and others well qualified for the class of work indicated. Two companies are being formed from the operating staffs, consisting of engine-drivers, signalmen, guards, shunters, and others of this class. These troops are under Colonel Twiss, R.E., and Lieut.-Colonel Waghorn, R.E. In France there is already a fine body of some 15,000 men completely organised for railway services of the nature indicated, and the British contingent will be able to deal with work which even this well-equipped French division cannot cover.

It is stated also, presumably on good authority, that a number of enginemen from various home railways are already in Belgium and France, learning the conditions there and assisting in the reorganisation of traffic working. Their assistance is necessary owing to the extreme depletion in the native staff created by war conditions, and the events of the campaign. It has been stated that about 600 French railwaymen were collected from the Amiens district alone and sent as prisoners into Germany; and probably the same sort of thing has occurred elsewhere, while the effects of mobilisation of reserves, death and other factors have also acted to render the assistance of our own railwaymen, as such, of vital importance.

Mr. J. A. F. Aspinall's Experiences.

When the war broke out Mr. J. A. F. Aspinall, General Manager, Lancashire and Yorkshire Railway, was at Homburg, where he had been holiday-making with Mr. Egerton Stewart-Brown, a barrister of the Northern Circuit; and his experiences of German prisons call for a few remarks, on the basis of a communication given to *The Times*.

"We were at Homburg taking a cure when the war broke out. We left the spa on August 17th with the intention of travelling straight to England. When we arrived at Wesel the party—two Englishmen and four English ladies—was ordered to leave the boat, and taken to the police station. The Military Commander informed us that, although the men were over forty-five years of age, they would require to be detained. He allowed the ladies to proceed.

"We were therefore marched under escort to the Citadel, and the Governor of the Citadel, after seeing us and some other prisoners, said that, so far as we two were concerned, he would give us the best treatment he could, as he desired to show the world how well they treated prisoners in Germany. The gaoler who had charge of us was a rigid disciplinarian, but I must say that he gave us all the assistance in his power and enabled us to obtain some additional comfort from the canteen.

"On Monday, August 24th, we were sent with about thirty-five prisoners with orders that we were to be taken to Sennelager, but on the way these orders were changed, and we were finally sent to Munsterlager. We travelled in a goods van, guarded by an officer and four soldiers, who carried loaded rifles. It was a terrible journey, and lasted from 12.13 on Monday, the 24th, to 6.30 a.m. on Tuesday, the 25th. We were not allowed to leave the van for any purpose, and we were not given any food till we got to Bremen at 12 midnight. At Bremen some coffee and pieces of sausage were handed to us. On arrival, at the station we were met by a large guard of soldiers and marched to the camp."

Mr. Aspinall records his experiences in prison, and in the camp for prisoners at Munsterlager until his release on September 21st. A casualty list published by the Press Bureau on September 28th includes thirty-nine names of prisoners of war interned at Munsterlager, Hanover. This list was brought over from Germany by Mr. J. A. F. Aspinall and Mr. Egerton Stewart-Brown, who were publicly thanked by the War Office for their services.

* * *

Transport of Wounded in France.

Although the French railways have provided special accommodation for the transport of wounded, though hardly on the scale that we have done, with time and opportunity vouchsafed to us, a large number of wounded soldiers have had to be conveyed as, and how, they could be dealt with. Writing from Havre, a correspondent of the *Daily Mail* stated that: "Our arrangements for transporting the wounded here

Digitized by Google

are wonderfully complete, and everything seems to be working smoothly. A train arrived here last week in charge of Major Gallie, in which the ordinary luggage-van type of trucks used in France for soldiers had been transformed into rough but very serviceable and practical invalid carriages. Each truck contains two stretchers slung one above the other on either side, two of them being slung on springs for ordinary cases and two fixed for cases of fractured limbs. There is a complete dispensary and a store car attached, with, of course, a detachment of trained orderlies."

* * *

War Conditions on French Railways.

A VIVID account of what war conditions entail appeared recently in the *Daily Telegraph*, and a few extracts may be quoted:

"At four o'clock yesterday afternoon I left Paris to motor to A——, a railway station some fifteen miles outside the capital. I wished to assist a party of French and American ladies in their voluntary task of feeding the sick and wounded soldiers as they pass through in the trains on their way from the front to hospitals in the remoter provinces of France. A——, the full name of which I abstain from giving at the request of that little band of helpers, who are giving so much in wealth and personal service, is a typical French suburban station. The station approaches and the platform were guarded by French reservists in the red and blue uniforms of a past generation. The officer in command told us that many wounded had passed in the day, and that many more would pass in the night, begging us to lose no time in getting ready to receive them.

"Within half-an-hour four large cauldrons containing coffee, milk, soup, and tea were simmering over charcoal fires, and upon trestle tables placed along the platform were bread, cheese, chocolate, biscuits, and other solid foods for those who might be well enough to eat them.

"Night settled down slowly on the scene. From time to time great endless trains, drawn sometimes by three labouring engines, toiled slowly through the station, carrying food and other supplies toward the front. Once an express engine and one coach went shrieking through at sixty miles an hour, carrying a staff officer from the front into Paris.

* * *

At a French Railway Station.

"When all our preparations were completed there followed an interval of waiting, until at about eight o'clock an officer hurried up, crying: 'Messieurs, mesdames, un train contenant quatre cents blessés va arriver à l'instant.'

"Jugs were filled with hot drinks, baskets with provisions and clothes, and then slowly there crept into the station out of the darkness a great train made up for the most part of third-class carriages and those rectangular box-shaped cattle-trucks which are specially designed in conscript countries for purposes of mobilisation. The wagons stretched far beyond the platform to where the maze of glistening, writhing rails was lost to sight in the night.

"Instantly at the windows of the third-class carriages appeared faces pale and bearded for the most part, and crowned with an indescribable variety of headgear. These were the slightly wounded. The front part of the train was filled almost entirely with these slight cases, the men being cheerful but very tired and dirty. Towards the end of the train were carriages where no faces appeared at the windows, and on opening the doors one saw some ragged and helpless victim of the war lying amid straw, crying feebly for drink, and asking if here at last was the hospital where his sufferings were to end. Further back still were the great cattle wagons, the doors of which were fastened with iron bars, and which when opened revealed six, eight, or even more men lying helpless in the straw, sometimes in total darkness, sometimes lighted by one lantern, the pale rays of which only added to the horrors of the scene. In one wagon eight of them were uniting in a ghastly chorus of suffering. We could hear them before we had slid back the great wooden doors, like voices crying from the tomb. The wagon was in darkness, so I fetched a lantern, and in its pale light saw their white faces staring up at me in various expressions of delirious agony. They were lying in the straw like animals unable to move hand or foot, their limbs swathed in blood-stained bandages, with no one to care for them or give them drink. For nearly two days they had lain in this dark and airless cattle-wagon, burned by fever, their wounds throbbing and stabbing at every movement of the train.

"All through the night train after train rolled in from the battlefield, and dawn breaking haggard across the silent city found us still at our task. By seven in the morning, when others relieved us, thirteen trains, containing over 3,000 wounded, had passed. Three thousand at one station in a single night. So it has been going on day and night for over fourteen days, and these are only the victims of one section of the battlefield. In the trains were some German wounded. Among the wounded there were no English, for they are dealt with by their own organisations, which, according to the testimony of the French surgeon-major at A——, are admirable, and 'tout à fait différents des nôtres.'

"The sufferings of most of the wounded men were, unfortunately, not destined to end at A——. After we had fed them the trains were placed in sidings, and the most serious cases removed and sent off to hospitals in the neighbourhood, but by far the larger number, after receiving some attention, are carried to so-called sanitary trains, to be transported to Brittany, the Vendée, or the South of France."

* * *

South Africa and the War.

OUR South African contemporary gives details of events in British South Africa due to the war, and especially affecting the railways there; and a few extracts will be of interest. An appeal made by the General Manager at the inaugural

Digitized by Google

meeting of the Railway Defence Association was met by a speedy and cheerful response, over 600 names being immediately enrolled. The D.R.A. is the outcome of the Railway Defence Rifle Club, the preliminary organisation of which had been in hand for some two or three months; but the outbreak of war changed the aspect of affairs, and instead of doing target practice at the new range the members of the D.R.A. have been in a position to render practical assistance to the Government and the country by guarding certain portions of the railways. In addition to the formation of the D.R.A., the S.A.R. Engineer Corps was also constituted and many hundred members enrolled themselves, all the chief centres being largely represented, while smaller numbers of recruits have readily offered themselves in the less populous districts. The members of the S.A.R. Brigade of the St. John Ambulance Association also placed their services at the disposal of the Government, and it must not, of course, be forgotten that included in the ranks of the Active Citizen Force called out for service are thousands of the S.A.R. staff. There are, therefore, many indications that the railwaymen of South Africa are not only willing but eager to do their share in the defence of the country and to serve the Union and the Empire at this time of stress.

The necessity for reducing expenditure so far as State enterprises and services are concerned is undeniable, and consequently it is not surprising to find that construction work of all kinds has been greatly curtailed and in many cases stopped altogether. On the railways train services have been restricted, a number of the long distance trains being withdrawn or else run at tri-weekly intervals instead of daily. Among the more important changes that have already taken place are the withdrawal of the "Transvaal Limited" (8 p.m. on Saturdays from Capetown to Johannesburg and Pretoria), the "Cape Limited" (8.35 p.m. on Saturdays from Johannesburg to Capetown), and the "Orange Limited" (on Tuesdays from Capetown to Johannesburg *viâ* the Free State); while the service of trains connecting Port Elizabeth and East London with the North has been reduced. The service between Johannesburg-Pretoria and Lourenco Marques has also been lessened.

* * *

Military Movements in Canada.

THE fact that special measures were necessary in connection with military movements in consequence of the war is shown by a description published by *The Canadian Railway and Marine World*, of the military concentration camp installed at Valcartier, in the Province of Quebec. On the outbreak of war the Canadian Militia Department, in anticipation of the acceptance by the mother country of the offer of Canadian troops for service abroad, proceeded to lay out a concentration camp at Valcartier, Quebec, 16·2 miles from Quebec, on the Quebec and Lake St. John Railway, now part of the Canadian Northern Railway system, where the troops might be placed in condition to be effective in assisting the British arms. To handle the large contingent promised, special railway facilities were required in a great hurry, and the railway officials proceeded immediately to put in such additional accommodation as would meet the requirements.

At Valcartier station the old Gosford branch of the Quebec and Lake St. John Railway leaves the main line. The site selected is in the area bounded by this line on the west, and by the main line on the south. As the main railway connection to the camp, a line 8,800 ft. long was laid from mileage 15·05 to a point on the Gosford branch, and a little west of midway in this line, three sidings were laid as the main transfer point, one of these sidings being double-ended, the other two entering only from the west. Several additional sidings have since been laid. A loop from the west end of the sidings is connected back into the Gosford line in the return direction, so that the traffic may make a return loop back to Quebec, providing an effective means of giving an uninterrupted service in the immediate vicinity of the camp. On this siding the Militia Department erected three commissariat buildings, each 48 ft. wide, two 300 ft. long, and the third 200 ft. long.

To the west of these three sidings another blind siding was laid, on which the Militia Department erected an ordnance building, 48 by 200 ft. A double-ended siding was also laid near the east end of the military cut-off, an unloading platform being erected. Beyond the west end of the cut-off a double-ended siding has been laid, with two branching blind sidings, to be used for official cars. The Gosford branch at the west end has no passenger service, so that it could be used as a long siding if required.

* * *

A Railway Journey from Switzerland under War Conditions.

MR. E. J. MILLER, secretary of the Railway Club, sends particulars of a journey made by his brother from Lucerne to England during the middle of August, showing the conditions of travel then involved.

	Arr.	Dep.	
Lucerne ..		*12.30 p.m.	First day.
Berne ..	*5.30 p.m.	*6.00 p.m.	
Geneva ..	*1.00 a.m.	*5.30 a.m.	
Bellgarde ..	*7.15 a.m.		Second day.
Do. ..	6.15 a.m.	7.00 a.m.	
Amberien ..	9.30 a.m.	1.30 p.m.	
Dijon ..	9.00 p.m.	10.20 p.m.	
Paris, P.L.M	9.30 a.m.		Third day.
Do. Nord		6.44 p.m.	
Amiens ..	11.30 p.m.	1.30 a.m.	
Boulogne ..	6.15 a.m.	7.10 a.m.	Fourth day
Folkestone	8.30 a.m.	9.20 a.m.	
London, C.X	11.15 a.m.		

*Central European time.

"The first change was at Berne, and at Geneva, where French vehicles were exchanged for Swiss, passengers were allowed to sleep in the train. At Bellgarde (where Western European time is observed) the French Customs and Passport examination took place, trains being

Digitized by Google

changed again. At Amberien all passengers were detrained and turned out of the station owing to certain military operations, the journey eventually being performed *viâ* St. Amour, after a further examination of passports. At Dijon another change of trains was necessary, and on the stretch of line Dijon-Paris the train omitted to call at certain unimportant stations, taking about 7 hours longer than the usual express times. For the rest of the journey in France and Switzerland the various trains called at all stations *en route*, and the trains were the normal examples of the restricted services then in operation in the two countries.

"The 6.44 p.m. from Paris was the ordinary advertised service at that time, and before embarkation at Boulogne tickets were examined and inspection of French and English passports made. Before leaving the boat at Folkestone the Alien restriction inspection was made, and the train journey to London was made without stop. It will be noticed that the journey took nearly 72 hours, instead of a normal time of 26¾ hours over the same route with only two changes of carriages, while from Lucerne to London the journey can be made in 15¾ hours *viâ* Bale, Belfort and Laon, a through carriage being run from Lucerne, though it is only fair to say that this route was not available at the time. The journey outlined took place just before the completion of French mobilisation, and about a week before the 'Government trains' started to run. These pursued the same route, practically, to Paris, and thence to Folkestone *viâ* Dieppe. The journey time was about the same, but the ride was not subject to the many inconveniences. No class of carriage was guaranteed, and passengers scrambled into any carriage that was convenient, the usual train-inspection of tickets being abandoned in view of the greatly reduced staff."

* * *

Uganda Railway.

In the June Railway Magazine reference was made to train services and facilities on the Uganda Railway, and in connection therewith a "Reader from No. 1," resident at Kampala, Uganda, writes as follows:—

"The paragraphs in question do not, I think, give one exactly the right impression of things, especially as regards the steamer services.

"(1) *Services to ports at the North end of the Lake.* The main train of the week leaves Mombasa on Fridays, arriving at Kisumu on Sunday at 6.45 a.m. The ss. *Clement Hill*, the largest passenger boat on the Lake, leaves Kisumu at 7.30 a.m. and arrives at Entebbe, the administrative capital of the Uganda Protectorate, on Mondays at 10 a.m., leaving again at 1 p.m. and reaching Kampala Port, serving Kampala, the commercial capital, at 3.30 p.m. The steamer leaves Kampala Port on Tuesday at 11 a.m., reaching Jinja, the terminus of the Busoga Railway, on Wednesday at 6 a.m. and leaving at 3 p.m., reaching Kisumu at 2 p.m. on Thursdays. Another service (Jinja direct) leaves Mombasa on Mondays, reaching Kisumu on Wednesday morning at 6.45. The *Sybil* or the *Winifred* leaves on Wednesday at 7.30 and arrives at Jinja on Thursdays at 9 a.m., leaving again at 9 p.m., arriving at Kampala Port Friday at 1 p.m. and leaving at 9 p.m., arriving Entebbe at 8.30 on Saturday and leaving at noon for Kisumu, arriving there on Sundays at 2 p.m.

"These two services enable passengers in East Africa or the different towns of Uganda to visit other places on business for a day or two and get back at once. Up to the middle of last year there was only the one boat leaving Kisumu on Sundays and so communication was difficult.

"(2) *Round the Lake Ports.* The train leaves Mombasa on Wednesdays and arrives at Kisumu on Fridays; the steamers leave after the arrival of the train and go round the Lake, alternately by the North and South routes, visiting all the ports in German territory also.

"The down trains connecting with the Northern ports steamers leave at 6.45 p.m. on Thursdays and Sundays, arriving at Mombasa on Saturdays and Tuesdays 10.30 a.m. The round-the-Lake steamers connect with the day train that leaves Kisumu on Tuesdays at 8.10 a.m. Passengers by the Tuesday and Friday trains pass over the Mau escarpment by daylight, all other trains, except a Saturday down local, pass over it by night.

"It is not correct to speak of 'Lake Victoria Nyanza,' as the word 'Nyanza' means Lake, hence the Lake should be called Lake Victoria or the Victoria Nyanza. The *Usoga* is a single screw steamer, not twin screw, and the *Rusinga* is not yet launched. Luncheon baskets are hoped for soon, but are not yet to be obtained.

"The new 'Kampala Port to Kampala' Railway, 7 miles in length, is not yet open for traffic, though it takes goods at owner's risk, no claims of any sort being admitted. It is, I suppose, an almost unique line. It possesses one locomotive, one of the oldest on the Uganda railway, and 12 open trucks. There are no points as yet and no sidings, so to Kampala the engine pulls the trucks and to Kampala Port it pushes them. There is as yet no water tower, though the pipes for a water column and the column itself are on the ground ready. The engine is at present filled by buckets from a spring. There is no engine shed, though two engine pits are made and the roof, etc., for shed is being got ready. Kampala station has been erected for many months, but it has not yet been used except as the railway engineer's office. A small goods shed has been also erected for some months at Kampala and into this the goods from the train have to be carried by hand, some 70 feet from the railway line. The ground is being levelled for sidings and in a short time all should be ready. Kampala Port station is being erected. The line is still in an elementary stage and requires much ballasting and straightening. It crosses one fairly large river; the engineers had some trouble in getting a solid foundation for the embankment, as the earth tipped in was absorbed by the swampy subsoil. This is the first railway in the kingdom of Buganda. (Buganda

Digitized by Google

is the kingdom, Uganda the Protectorate). It of course crosses all roads on the level (the Uganda railway itself possesses one bridge only over a road, and one tunnel). It is proposed to extend this railway finally to the Albert Nyanza, and in the near future it is hoped to extend it to Mityana, 45 miles off.

"I had been intending for some time to write to you *re* this little railway of ours, and the *Pertinent Paragraphs* in the June MAGAZINE brought my determination to a head. Though of course cut off from the Uganda Railway itself by the Lake, I get all the information I can about it, and was down in Nairobi in May, when I went over the works. You may be interested to know that there are at present 4 goods trains daily from Mombasa to Voi (103 miles), 2 from Voi to Makindu (209 miles), 2 Makindu to Nairobi (327 miles), 3 Nairobi to Nakuru (448 miles), and 3 from Nakuru to Kisumu. I think they can run heavier trains on the Voi to Nairobi sections, hence the reduction in the number of trains. A second passenger train can be run from Mombasa to Nairobi, leaving Mombasa at 1.30 p.m., if the 12 noon train will not take all the passengers. The policy of the present General Manager is to increase the number of stations so that more trains may be run."

* * *

Guarding the Uganda Railway.

SINCE the previous paragraph was prepared for publication the Uganda Railway has been concerned in military operations due to the war. Some weeks ago the news came to hand from Kisumu that the ss. *Kavirondo*, a steamer of the Uganda Railway marine service, captured the German dhow *Harold*. Later on the same day, when the *Kavirondo* was off Majita Bay, a loaded dhow was noticed off the pier. When the steamer approached the enemy opened fire by volleys, but did no damage. The *Kavirondo* replied with her nine-pounder and sank the dhow with the fifth shot. On the 15th inst. two squadrons of the East Africa Mounted Rifles, who were entering Karungu Bay on the ss. *Winifred*, were fired on by the German steamer *Owanzu*.

Other events affecting the Uganda Railway and the steamers in connection with it, have occurred, special steps being taken to guard the line. At the end of August details of an attempt by Germans to blow up the railway line between Mombasa and Nairobi, near Voi, came to hand. A patrol was set to watch the track from Maungu to Kasigau, and an armoured train traversed the line. Reports were received that the Germans had crossed the line at Maungu in the afternoon, returning in the evening. They were followed up by men from the armoured train. All traffic was stopped for the night on the line between Voi and Mackinnon Road, Maungu being the intermediate station. The line was then carefully patrolled and examined, with the result that two Germans, with 30 lb. of dynamite in their possession, were captured on the line close to Maungu in the early morning.

German Railways in Africa.

THERE are two railway lines in the German East Africa Protectorate—the Usambara line and the Central or Tanganyika Railway. The Usambara Railway is 220 miles long and runs from Tanga to New Moschi at the foot of Mount Kilimandjaro. The line was commenced in 1893, and the first section (to Mombo, 80 miles from Tanga) was opened to traffic in 1905. The remaining portion of the line was opened in February, 1912. The Central Railway, which runs from Dar-es-Salaam to Lake Tanganyika, a distance of 780 miles, was begun in 1905. The first section was finished as far as Morogoro (130 miles) early in 1908, and in the same year the extension as far as Tabora (440 miles from Morogoro) was sanctioned. Tabora was reached in February, 1912, more than two years before the date fixed in the original project. The continuation of the line to Tanganyika was sanctioned in 1911; the River Mlagrassi, the chief difficulty, was bridged in the spring of 1913, and the railhead reached the lake at Kigoma, near Ujiji, on February 2nd, 1914.

Togoland, the German colony in Upper Guinea, has about 200 miles of railway. The Kamerum Protectorate, situated between British Nigeria and the French Congo, had, at the end of 1913, railways to the extent of 149 miles, but other lines were in course of construction and others were projected. The railways in existence in German South-West Africa are:—(1) A Government (3 ft. 6 in. gauge) line from Swakopmund *viâ* Karibib (121 miles) to Great Windhuk (237 miles), whence it has been extended southward to meet No. 3 at Keetmanshoop, the combined length of these two systems is about 650 miles; (2) a Government line (2 ft. gauge) from Swakopmund to Tsumeb (361 miles), with a branch line from Otavi to Grootfontein; (3) a Government line (3 ft. 6 in. gauge) from Luderitzbucht *viâ* Seeheim to Keetmanshoop (228 miles), extended northward to meet No. 1; (4) a Government line from Seeheim (on No. 3) to Warmbad (112 miles).

* * *

Escalators at Baker Street Station.

THESE were brought into use on October 15th. The chief gain of these conveniences of travel is that there is no waiting for lifts, and frequently an incidental gain of only one or two minutes actually results in a saving of at least five or six minutes, as the difference between lift and escalator ascents and descents will often result in catching an earlier train in the latter case. These escalators, which are of the well-known Waygood-Otis design, would have been completed earlier had it not been for recent strikes in the building trades, followed by the outbreak of war. In essentials there is nothing of special interest, the installation being similar to others already in use. The escalator tunnel is 16 ft. 4 in. diameter, and contains both ascending and descending stairways, there being no fixed stairway, one of the escalators being reversible. Mr. H. H. Dalrymple Hay, consulting engineer to the London Electric and associated railways, was responsible

Digitized by Google

for the construction of the escalator tunnel, while Mr. W. Willox, chief engineer to the Metropolitan Railway Company, had charge of the upper and general constructional work. Mr. O. G. C. Drury was resident engineer and Mr. C. W. Clark, architect.

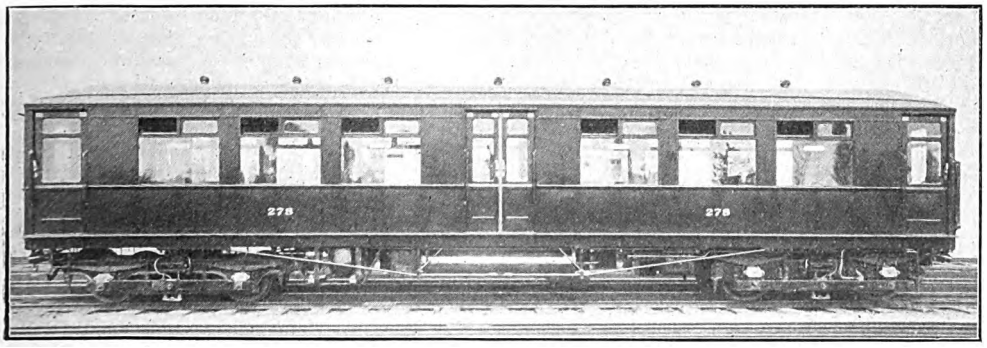
A new footbridge has been erected to connect the two island platforms of the Extension line section of the Metropolitan station. Interchange passengers pass down descending stairways adjacent to an underground hall or circulating area directly under the through Metropolitan lines. Here are neatly designed booking offices between the two stairways, with an illuminated indicator of McKenzie, Holland and Westinghouse design, working in conjunction with the two others already in use in the upper station. Adjacent to the lower ends of the escalators passages lead to either side, first to a stairway to the up London Electric platform, which is at a lower level than the other; and, secondly, to a passage way passing over the up tube to the platform of the down London Electric line. The distances involved are very short. From the Metropolitan platforms to the down "tube" platform the vertical distance is 44 ft., to the "up" platform it is 54 ft. 4 in., the escalators accounting for 31 ft. 3 in. of this. For the street traffic of the London Electric Railway the lifts are retained in use.

* * *

New Steel Rolling Stock: Metropolitan District Railway.

In the Railway Magazine for December, 1913, drawings were given of new steel rolling stock on order for the Metropolitan District Railway. By the courtesy of Mr. W. A. Agnew, Chief Mechanical Engineer, photographs of these vehicles are reproduced. The structure of the car is of steel throughout. Interior panels are of steel in mahogany framing with steel ornamental mouldings at the cornices, etc., the steel panelling and mouldings having been supplied by Messrs. John Lysaght, Ltd., of Newport, Mon. A new scheme of lighting has been adopted in these cars, which are lighted by six three-light fittings fitted with "Superflux" globes along the centre line of the ceiling and a single-light bracket over each cross-seat. The leading particulars of the cars are as follows:—Length over headstock, 49 ft.; length over-all, 49 ft. 9 in.; bogie centres, 34 ft. 1 in.; width over framing, 8 ft. 8 in.; height from rail to top of roof, 11 ft. 11½ in.; number of seats per car, 48; diameter of driving wheels, 36 in.; diameter of trailing wheels, 30 in.; wheelbase of motor bogie, 7 ft. 6 in.; wheelbase of trailer bogie, 7 ft.; weight of motor car complete, 34 tons; weight on driving wheels (4), 21½ tons; weight on trailing wheels of motor car, 12½ tons; weight of motor car body without equipment, 16 tons; weight of motor car body completely equipped, 19½ tons; weight of motor bogie without equipment, 5½ tons; weight of motor car bogie completely equipped, 11 tons; weight of trailer bogie, 3½ tons; weight of trailer car complete, 22 tons; weight of trailer car body complete, 15 tons; number of trailer cars in train per motor car, 1; number of motors per motor car, 2; horse-power of each motor, 250.

The cars and bogies were built by the Gloucester Railway Carriage & Wagon Company. Seating is upholstered in moquette velvet, and was supplied by the General Seating Company. The steel floors are covered with "Sanit" composition. Lighting fittings are of aluminium, and supplied by the General Electric Company. Each motor car has a 35 cubic ft. compressor for brakes, half being supplied by the British Thomson-Houston Company and half by the Knorr Brake Company. The electrical control equipment and traction motors were supplied by the British Thomson-Houston Company, the control being Type M and the motors G.E.212 of 240 h.p., and gear for speeds of approximately 35 miles per hour. The traction gear wheels are solid cast-steel type with shrunk-on rolled steel rims on which the teeth are cut. The motor bogies are of pressed steel with leaf springs over the axle boxes and "Parabo" auxiliary springs and Timmis bolster springs. The wheels are 36 in. Schoen solid steel wheels. The trailing bogies are primed steel with springs as above and 30 in. disc centre wheels. The bolster springs of all bogies are mounted on pads of anti-vibration material supplied by the British Anti-Vibration Company. The interior grab-handles, door handles and strap rails are polished



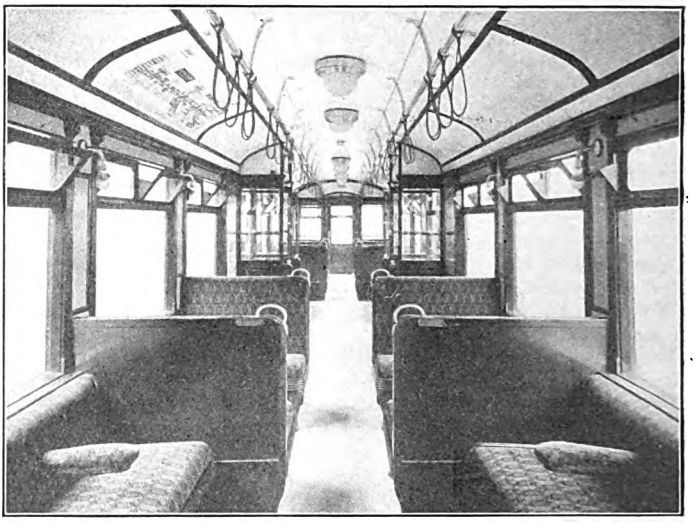
Photo] [*Wakefields, Ealing.*

NEW STEEL CARS: METROPOLITAN DISTRICT RAILWAY.

Digitized by Google

aluminium alloy. Each car is fitted with 20 B.T.H. electric heaters under the seats. The company's standard automatic couplings are fitted. Westinghouse brakes with improved triples are employed. The cars are painted in the Company's standard colours of red and engine lake, the interior being finished to represent mahogany with interior roofs painted in flat white enamel. Interior roofs are of Bell's asbestos. The amount of wood used in the cars is small, and has all been rendered fire-resisting by the Oxylene process of the Timber Fire proofing Company.

* * *



Photo] [*Wakefields, Ealing.*

INTERIOR OF STEEL CAR: METROPOLITAN DISTRICT RAILWAY.

Improvements at Euston.

In front of the Great Hall a portion of the courtyard has been brought forward and covered in by means of glazed roofing. Behind the courtyard is a wide "loggia" extending right across the frontage so as to give access to platform No. 6 and to the subways leading to local platforms Nos. 4 and 5 and the arrival side of the station, also to the underground halls serving the London Electric and City and South London "tube" lines, while at the other end it communicates with platform No. 9 and platforms beyond. This "loggia" is being artistically designed, with glazed arched roofing, and neat stone frontage, pierced with a series of openings. On its northern side, to the right will be the main booking windows, with booking offices behind and season ticket office adjacent to the subway already mentioned. To the left will be the excursion booking offices, while the wide passage-way giving access to the Great Hall will be flanked on one side by the inquiry office and on the other by a telegraph office.

These changes are now taking shape, much of the stonework being already erected, while the roof of the "loggia" is in process of construction. The re-arrangement of the courtyard and covering in has been completed for some time. Adjacent to No. 6 platform most of the alterations are already completed. The reproach has often been advanced that Euston hardly does justice to its importance. It has, indeed, long suffered from the disadvantages which attach to all stations which have reached the large dimensions requisite for modern traffic conditions by a slow process of additions. But as the work now in hand reaches the completion stages, which may be expected at an early date, this reproach will cease to have any justification, and as regards the public offices and conveniences in the centre of the station, they will compare on equal terms with the most æsthetic and complete station buildings with which comparison may be made.

* * *

Metropolitan Railway and the War.

The General Manager of the Metropolitan Railway (Mr. R. H. Selbie) announces the formation of a Corps composed of men over 35 years of age employed by the Metropolitan Railway Company, who will be instructed in drill and musketry practice on land adjoining the Metropolitan Railway station at Wembley Park. It is proposed to form camps where the men can be trained at week-ends under military conditions. The Corps is expected to number about 500 men. A large number of Metropolitan Railway employés have joined the colours either as regulars or territorials, and have been assured of employment being found for them on their return in similar grades to that which they have been occupying. Weekly allowances are meanwhile being made to their wives and families. A regular weekly subscription during the war has also been organised among the Company's men in all departments, the proceeds of which are being administered by a Committee of the men themselves, who have also arranged for the systematic visiting of the families of the men who have enlisted, with a view to any cases of distress or emergency being reported upon and relieved.

* * *

4-6-0 Superheater Locomotives on the London and North Western Railway.

The following are complete lists, to date, of the 4–6–0 locomotives of the "Prince of Wales" and "Sir Gilbert Claughton" classes:—

"Prince of Wales" Class.

(In order of building).

819 *Prince of Wales.*
1388 *Andromeda.*
1452 *Bonaventure.*

Digitized by Google

1454 *Coquette.*
1537 *Enchantress.*
1691 *Pathfinder.*
1704 *Conqueror.*
1721 *Defiance.*
2021 *Wolverine.*
2359 *Hermione.*
362 *Robert Southey.*
892 *Charles Wolfe.*
1081 *John Keats.*
1089 *Sydney Smith.*
1134 *Victor Hugo.*
2040 *Oliver Goldsmith.*
2075 *Robert Burns.*
2198 *John Ruskin.*
2205 *Thomas Moore.*
2213 *Charles Kingsley.*
321 *Henry W. Longfellow.*
479 *Thomas B. Macaulay.*
951 *Bulwer Lytton.*
1679 *Lord Byron.*
2249 *Thomas Campbell.*
2283 *Robert L. Stevenson.*
307 *R. B. Sheridan.*
637 *Thomas Gray.*
979 *W. M. Thackeray.*
1400 *Felicia Hemans.*
86 *Mark Twain.*
146 *Lewis Carroll.*
964 *Bret Harte.*
985 *Sir W. S. Gilbert.*
1321 *William Cowper.*
2152 *Charles Lamb.*
2293 *Percy Bysshe Shelley.*
2377 *Edward Gibbon.*
2443 *Charles James Lever.*
*2520 *G. P. Neele.*

* Originally *Francis Bacon*, but was renamed before being put into service.

"CLAUGHTON" CLASS.
(In order of building).

2222 *Sir Gilbert Claughton.*
1161 *Sir Robert Turnbull.*
1191 *Sir Frank Ree.*
1319 *Sir Frederick Harrison.*
1327 *Alfred Fletcher.*
21 *Duke of Sutherland.*
163 *Holland Hibbert.*
650 *Lord Rathmore.*
1159 *Ralph Brocklebank.*
2046 *Charles N. Lawrence.*
250 *J. A. Bright.*
260 *W. E. Dorrington.*
1131 *Lord Faber.*
1429 *Colonel Lockwood.*
2239 *Frederick Baynes.*
209 *J. Bruce Ismay.*
668 *Rupert Guinness.*
856 *E. Tootal Broadhurst.*
† *Charles J. Cropper.*
† *Lord Kitchener.*

† Not numbered yet.

* * *

A Railway Reminiscence.

In the newly published memoirs of Admiral Lord Charles Beresford there appears at least one railway anecdote. Lord Charles was with the late King Edward VII. when as Prince of Wales he visited India and it is in this connection the following story is told:—

The Duke of Sutherland, during the Prince's journeys overland in India, took an intense delight in driving the engine, from which it was hard to tear him away. We had halted at a station where the customary ceremonial had been arranged, and had changed into uniform, all save the Duke, who was nowhere to be seen.

"Where can he be?" said the Prince.

I submitted that he might be on the engine, and went to see. Sure enough, the Duke was sitting on the rail, his red shirt flung open, his sun-helmet on the back of his head. In either black fist he grasped a handful of cotton waste, with which he was mopping up the perspiration of honest toil. He hurried to his carriage to change into uniform and presently appeared buttoning his tunic with one hand. In the other he still grasped a skein of cotton waste."

* * *

The Railways of our Allies.

It is not possible to deal with developments on the railways of France, Belgium and Russia in the same way as we can with those at home, though general particulars were given in the September RAILWAY MAGAZINE. In fact, the marvellous work which is being done, and which would under other conditions be estimated at a very high level, is necessarily overshadowed by the more essential matters so that very little news comes through. From what is available, however, it is manifest that the conduct of the war is almost as much dependent upon the efficiency and sufficiency of the railway communications as it is upon the direct war equipment. It has been stated that the German frontier lines have been laid out with a special view to military requirements; but whether expressly designed for the same purpose or not the railways of the allied nations on the Continent have proved exceptionally useful, and many notable achievements of transport are to the credit of the operating staffs. Conveyance of military material, stores, equipment and the removal of wounded have been everyday operations, and in many cases a great deal of refugee traffic has also had to be dealt with, sometimes without payment of fares, and to meet an exceptional demand. There has been much destruction of railway lines and equipment, and many difficulties have had to be overcome; but the responsibility and value of the railways has been fully maintained. In this connection, the special conditions have extended even to other nations, as for example, the evacuation of Antwerp, thousands of refugees being accepted and conveyed by the Dutch railways to Rotterdam and other places, in numerous cases without the payment of fares or the possession of tickets. Indeed, when the full story of this great war comes to be written the part played by the railways, and by railway companies' steamers and road vehicle equipment will become historic and constitute one of the most notable phases of the whole campaign.

Digitized by Google

An extraordinary general meeting of the proprietors of the East London Railway was recently held, and a resolution passed approving the application of the Board of Trade for a certificate extending the time for the sale of superfluous lands and authorising the Company to retain and hold such lands until June 20th, 1925. Lord Claud Hamilton explained that the property consisted of land and houses in the parishes of St. Mary, Whitechapel, St. George's in the East, and neighbouring parishes, mostly acquired between the years 1866 and 1876, with the exception of some houses in Raven Row which were acquired in 1883 in connection with the construction of the Whitechapel Extension Railway. The law obliged the sale of all superfluous lands within ten years from the time limited for the completion of the works, and provided that in default thereof all such surplus lands remaining unsold at the expiration of such period should vest in, and become the property of, the owners of the lands adjoining thereto. The time during which the Company was authorised to hold the lands had been extended by Parliament, and would expire on June 20th, 1915. A clause was inserted in the Great Eastern Railway's bill of this year extending the time for the further period of ten years, namely, until June 20th, 1925. That bill, owing to the opposition of the Labour Party and the Nationalists, had been rejected, because the railway Company had, with a view to the maintenance of discipline, dispensed with a police constable. Under the law, however, it was possible to apply to the Board of Trade for a certificate which would have the same effect as the bill with regard to the extensions of time for the disposal of the Company's surplus lands, and the proprietors were, therefore, called together to consider a resolution, in order that an application might be made to the Board of Trade for that purpose. The form of certificate applied for asked for an extension of the time for ten years until June 20th, 1925. It did not follow, however, that the Board of Trade would grant a certificate in the form asked for. It might only grant it for a less term, which, however, would probably be sufficient to enable the Company to obtain a provision for further extensions in one of the Leasing Companies' future Acts of Parliament.

The Lancashire and Yorkshire Railway have opened a new station at Gladstone Dock, Seaforth, and a service of electric trains is now in operation between Aintree, Ford, Linacre Road and Gladstone Dock. In connection with the extension of the Blackpool season, the following additional trains will be run:—Week days: 12.40 p.m. Manchester to Blackpool (Central), Saturdays excepted; 9.40 a.m. Accrington to Blackpool (Central), Mondays and Fridays during October; 1.15 p.m. Daisy Field to Blackpool (Central), Thursdays only during October; 1.7 p.m. Nelson to Blackpool (Central), Tuesdays only during October; 1.35 p.m. Accrington to Blackpool (Central), Wednesdays only during October; 1.7 p.m. Nelson to Blackpool (Central), Saturdays only; 2.5 p.m. Accrington to Blackpool (Central), Saturdays excepted; 7.17 p.m. Accrington to Blackpool (Central), Saturdays only; 8.50 p.m. Blackpool (Central) to Colne daily during October; and on Saturdays only from November 7th; 9.10 p.m. Blackpool (Central) to Accrington; 7.25 a.m. Bradford to Blackpool (Central), Mondays only; 10.6 a.m. from Leeds (C.) and 10.20 a.m. from Bradford to Blackpool (Central), Wednesdays and Thursdays excepted during October; 3.15 p.m. Blackpool (C.) to Bradford and Leeds, Wednesdays and Thursdays excepted during October. Sundays (during October): 1.10 p.m. Manchester to Blackpool (Central); 4.55 p.m. Preston to Blackpool (Central); 10.15 p.m. Blackpool (Central) to Preston; 7.45 a.m. Colne to Blackpool (Central); 8.20 p.m. Blackpool (Central) to Colne; 8 a.m. from Leeds (C.) and 8.17 a.m. from Bradford to Blackpool (Central); 8.5 p.m. Blackpool (Central) to Bradford and Leeds.

* * *

We regret to announce the death of the Rev. J. T. Lawrence, whose name will be familiar to most readers of the Railway Magazine as a frequent contributor on railway subjects, foreign and colonial as well as of home interest. Since 1909 he has been vicar of St. Peter's, Accrington. Mr. Lawrence was on holiday in Switzerland at the outbreak of the war, leaving Accrington on July 28th, just before hostilities commenced. He was detained in Switzerland until August 23rd, when he left Montreux, reaching home on Wednesday, August 26th, after

Digitized by Google

travelling by train and boat for 76½ hours. Although his return ticket was *viâ* the route through Germany and Belgium, including Mullhausen, Namur and Brussels where there had been fighting, fortunately he and about 400 others were able to travel through France and over the Channel instead of from Zeebrugge to Hull. On his way to Switzerland he visited among other places, Namur, Luxemberg and Mullhausen, and was in Strasburg when war was declared. Mr. Lawrence had considerable difficulty in getting to England, travelling in a very stuffy and crowded compartment under military supervision, and there were no corridors for the long journey. Arrangements were, however, made for stops at ten miles with an occasional half hour, an hour's halt being made at Montargis, where tubs were placed on the platform for a wash. All along the route people cheered and sang patriotic songs. At Dieppe the night was spent on board the boat and leaving on the Tuesday morning, Folkestone was reached in the afternoon.

Mr. Lawrence was very tired and not in the best of health when he got home after his 76½ hours' exciting and uncomfortable journey, during which he slept very little and the food was somewhat scanty and irregular. He had a rest, but not feeling well, he went to Harrogate on Tuesday, September 8th, to recuperate. He was taken suddenly ill and an operation was deemed imperative. On the following Saturday he underwent a serious operation at a nursing home. Mr. Lawrence's strength gradually declined and not being able to rally the end came on Wednesday, October 7th. Hopes were entertained of his recovery to within a few days of his death. Evidently he had been fighting against a growing and insidious malady for some time. Besides his interest in railway affairs, assisted, besides his frequent visits to Continental resorts, by his eleven years' service in India, Mr. Lawrence held a high position in the Masonic world, and was an authority on musical subjects, especially the organ. He was, in fact, a prolific writer on a wide range of subjects, though he is known best to RAILWAY MAGAZINE readers by his contributions dealing with railways. As a preacher and an organiser of church and local affairs he was highly esteemed in Accrington. He leaves a widow, two sons and a daughter.

* * *

MR. ALFRED ASLETT, the Secretary and General Manager of the Furness Railway, unofficially entertained Colonel George Dixon, Major Scoular and several other officers of the 5th Border Regiment (Workington) to luncheon at Furness Abbey Hotel, on Friday, September 25th, 1914, in anticipation of the Regiment leaving Barrow for other duties. Later on they expect to go to the Front should the war unfortunately continue. The Right Hon. Lord Muncaster, Honorary Colonel of the 5th Border Regiment, and Lord Lieutenant of the County of Cumberland, would much have liked to be present at the luncheon, but was unable to do so. He, however, wrote a letter to Mr. Aslett, which we are glad to publish in our columns, as it is calculated to materially assist recruiting and do good in other ways to the military service. Lord Muncaster, we may add, served in the Crimea.

Muncaster Castle,
Ravenglass, Carnforth,
September 24th, 1914.

Dear Aslett.—

I wish heartily that I were able to attend the lunch you are giving in honour of the 5th Battalion Border Regiment to Colonel Dixon and the officers and to which you have so kindly invited me, but my age and some infirmities consequent thereon forbid me taking part and being with you on this interesting occasion. Will you express my great regret as being absent.

I am very proud to be connected with the Battalion which has done so well and set so good an example in volunteering for the front. I can no longer expect to join them and can only say how I feel confident that they will uphold the old flag of England right well wherever they may be called, and I trust that I may be spared to welcome their home coming after a most successful campaign, and so through you I bid Col. Dixon and his Battalion a hearty adieu and au revoir.

Yours most truly,
MUNCASTER.

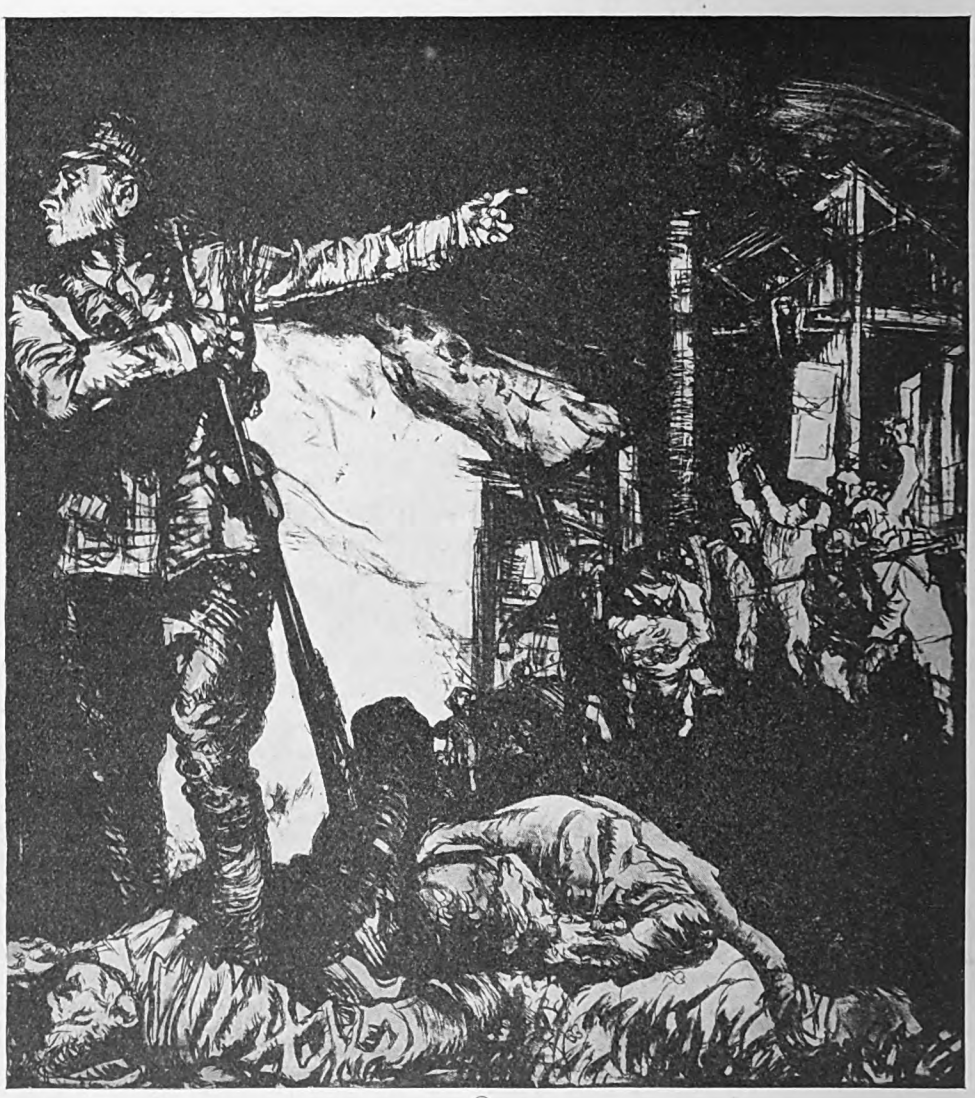
* * *

THE London, Brighton and South Coast Railway have revised their train service for the winter season. The existing uncertain state of affairs prohibits any improvements of great importance being introduced, but the following will be of interest: The 8.16 a.m. from Brighton *viâ* Uckfield, Buxted, Crowborough, and Eridge to Victoria, leaves at 8.10 a.m., and is a non-stop train from Eridge at 9.22 a.m., arriving at Victoria 10.20 a.m., an acceleration of fourteen minutes. This also improves the London connection from the Eastbourne branch line. The 9.18 a.m. Tunbridge Wells to Ashurst leaves at 9.28 a.m. direct to Victoria, and serves Groombridge, Ashurst, Cowden, Edenbridge Town, Oxted, East Croydon and Clapham Junction, arriving at Victoria 10.40 a.m., an acceleration of eight minutes. The 7.45 p.m. Victoria to Eastbourne calls at Hampden Park at 9.39 p.m., this also gives a connection for Pevensey, Bexhill, St. Leonards, and Hastings by changing into the 9.40 p.m. from Eastbourne. The 2.3 p.m. Brighton to Hastings leaves at 1.55 p.m., and is a through train to Ashford, giving connections to Canterbury, Dover, etc. The 9.33 a.m. Hastings to Brighton is a through train from Ashford (South Eastern and Chatham Railway).

* * *

IN consequence of the extension of the 2.3 p.m. train from Brighton (altered to 1.55 p.m.) to Hastings onwards to Ashford (South Eastern and Chatham Railway) and the corresponding alteration of the 9.33 a.m. from Hastings, this service is now being worked throughout by South Eastern and Chatham locomotives.

Digitized by Google



MR. FRANK BRANGWYN'S SUGGESTIVE POSTER WHICH NOW APPEARS AT NEARLY EVERY UNDERGROUND RAILWAY STATION.

As an aid to stimulate recruiting during the present crisis, Mr. Frank Brangwyn, A.R.A., has voluntarily executed the poster reproduced on this page, and which graphically depicts a soldier appealing to his countrymen *To Arm* with a view to preventing England from sharing in the suffering and outrage which has overtaken many unfortunate towns and villages on the Continent. This poster, which is striking enough in itself to need no wording, is being displayed by the side of a smaller recruiting bill in prominent positions at nearly every UndergrounD station in London and Greater London, and quite apart from its undoubted influence to gain men for the ranks, will be another addition to the series of striking posters brought out from time to time by the UndergrounD Railways.

* * *

THE Cambrian Railways offer to lend a set of lantern slides, together with a book of notes, dealing with some of the most beautiful parts of North and Mid-Wales, to anyone desirous of giving a lantern lecture on Wales. The Company also have cinematograph films—(1) "A Trip to Cardigan Bay" (length about 500 ft.), and (2) "A Glimpse of the Upper Wye Valley," (length about 400 ft.), including the Birmingham Corporation Waterworks, which they lend out free of charge to the proprietors of cinema halls and other places of entertainment, who are prepared to exhibit them. For full particulars

Digitized by Google

apply to Mr. Herbert Williams, Superintendent of the Line, Cambrian Railways, Oswestry.

* * *

On Saturday, September 26, at 7 p.m., a meeting of the Institution of Locomotive Engineers was held at Caxton Hall, Westminster, a paper being read by Mr. A. Kingsley Ward, of Sunderland, on "The Application of Diesel Engines to Locomotives."

* * *

At the meeting of the Railway Club, on Tuesday, September 15th, a paper was read on "Bournemouth and Its Railway Facilities," by Mr. A. W. Bartlett. On Tuesday, October 13th, the subject was "The History of the Great Central (late M.S. and L.) Railway," by Rev. W. J. Scott, B.A. Owing to the fact that Mr. Basil Mercer has joined the colours his paper arranged for November 12th is postponed. Mr. J. F. Gairns, editor of the Railway Magazine, has promised to give his paper, arranged for the January meeting, on that date, his subject being "Railway Nationalisation: is it desirable, practicable or probable?" Several members of the Railway Club are serving the country in various capacities. The following are at present known: 2nd-Lieut. M. G. S. Blane, 2nd Batt. Cameron Highlanders; Lance-Corporal B. M. Bazley (Basil Mercer), King's Own Rifles; Pte. K. Fitch, 3rd Batt. Scots Guards; Pte. B. S. Hubbard, University Training Corps.

* * *

The Lancashire and Yorkshire Railway have just issued a syllabus of lantern lectures. The series comprise ten lectures, which deal with the popular holiday and pleasure resorts in Lancashire and Yorkshire, Wales, Ireland, Isle of Man, Belgium, etc. In view of the state of affairs in Belgium the lecture dealing with that country is especially interesting at the present time. Full particulars of the conditions of loan may be obtained from Mr. A. Watson, Superintendent of the Line, Manchester.

* * *

The 1914-15 session of the London School of Economics and Practical Science commenced on Thursday, October 8th. The courses on railway subjects were inaugurated by inaugural lecture by Mr. W. Tetley Stephenson, on Monday, October 12th, his subject being "The Relations Between the Railways and the State in other Countries." The Chair was taken by Sir Charles Owens. Sessional arrangements include courses of lectures as follows:—(1) "Railway Organisation": Mr. Cleveland-Stevens; (2) "Railway Rates and Fares": Mr. Stephenson; (3) "The Geography of the Chief Railways of Canada and the Neighbouring Lines in the United States": Professor Sargent; (4) "The Parliamentary History of English Railways": Mr. Cleveland-Stevens; (5) "Railway Economics—Operating": Mr. Stephenson; (6) "Railway Economics—Commercial": Mr. Stephenson; (7) "The Relations Between the Railways and the State in Other Countries": Mr. Stephenson; (8) "The Law of Carriage by Railway": Mr. Disney; (9) "The Law of the Traffic Relations of Railways to other Railways and the Public": Mr. Moon; (10) "The Economics and Electric Traction": Mr. Henry M. Sayers; (11) "Railway Docks and Shipping": Mr. Lamb.

* * *

In a recent issue of the Railway Magazine an illustration was given of the Furness Railway Company's exhibit at the Anglo-American Exhibition. Mr. Alfred Aslett, the well-known General Manager of this line, is to be congratulated on the fact that his railway has been awarded a diploma for Grand Prize for this exhibit, and have also expressed their congratulations upon the merit of the Company's exhibit.

* * *

Great Western Railway 2–8–0 goods tank engines are no longer confined exclusively to mineral work in the South Wales district. They are now to be seen working regularly east of Bristol on the old main line, taking turns with the 2–8–0 tender engines. The two classes of 2–6–0 engines (4 ft. 6 in. and 5 ft. 8 in.) with inside and outside cylinders respectively, are also in constant use over this section, with an occasional 2–6–2 tank, so that all modern goods locomotive types are well represented, besides the older 0–6–0 tank and tender patterns.

* * *

The Great Western Railway is extending the use of motor vans for its parcel delivery services, and three vehicles have recently been brought into use in Bath for this purpose. Experimental services were introduced in the district some months ago. Up to now the Company has relied exclusively on horse haulage for the collection and delivery of goods and parcel traffic in Bath. The Midland has for some years used both steam and petrol-driven lorries to conduct a goods service (competing with the Great Western Railway) from their Bath depot to certain Wiltshire towns.

* * *

As referred to elsewhere, one of the novelties of the new Great Eastern timetables is the introduction of trains between London and Clacton-on-Sea in 95 minutes, while Southend-on-Sea, besides a magnificent service of trains in a few minutes under or over the hour has one morning express in 55 minutes, and two in 57 minutes. Both Clacton and Southend are coming into considerable favour for residential traffic, with ample train service to suit all requirements, including late trains and a supper car train at midnight to Clacton every Saturday and Southend every week-night, while season ticket rates are exceptionally reasonable. Both of these resorts have a southern aspect, and are noted for their sunshine records and mild temperatures. For week-end visits cheap fares are in operation, with trains to suit all requirements. Frinton-on-Sea and Walton-on-the-Naze share in all the Clacton facilities. Tourist, excursion and other tickets are also available. Full particulars can be had on application to the Superintendent of the Line at Liverpool Street station, or from stations and town offices

Digitized by Google

It is stated that the Great Western Railway contemplates spending a large sum of money in laying down new sidings and other improvements between Warminster, Codford, and Wishford. These developments have been rendered necessary by the establishment of the large military camp at Codford, in the Wylye Valley of Wiltshire. It is stated that railway accommodation is to be extended from Codford Great Western Railway station to the camp, this necessity having arisen through the great distance from one point to another. Some of the camps are situate as far as three and four miles from the railway station.

* * *

Lord Rosebery has made a donation of £1,200 to the London School of Economics and Political Science for the endowment of a prize to be awarded annually in the department of railway transport at that School of the University of London. Regulations for the award will shortly be drawn up by the Advisory Committee on Railway Subjects, which includes among its members, Sir Sam Fay, Sir George Gibb, Sir Charles Owens, Mr. Francis H. Dent, Mr. Frank Potter, and Mr. H. A. Walker.

* * *

At the Imperial College of Science and Technology, the following courses of railway application have been arranged for the 1914-1915 season:—Tuesdays and Thursdays, commencing October 8th, "The Steam Locomotive," Prof. W. E. Dalby; Wednesdays, commencing October 7th: "Railway Organisation," Mr. W. T. Stephenson; Tuesdays and Fridays, commencing January 12th, 1915: "Railway Signalling," Mr. H. G. Brown; Mondays, commencing January 18th, 1915: "Electric Traction and Railway Electrification," Mr. Philip Dawson; Tuesdays, commencing February 16th, 1915: "Bridge Design and Permanent Way," Mr. H. Deans.

* * *

On Friday, October 16th, a special course of lectures on "Transport and War: The part played by railway and road transport in modern warfare," was commenced by Mr. W. T. Stephenson, at the London School of Economics. The course involved four lectures, on successive Fridays, at 6.30 p.m., the fee being 7s. 6d.

* * *

We are asked to mention that the photograph reproduced on page 199 of the September Railway Magazine, for illustrating Mr. W. F. Lawrence's article on "Railway Goods Warehouses," was taken by Mr. A. F. Armstrong, of Newcastle-on-Tyne.

An extensive system of additions to the existing railways in the neighbourhood of Sydney, N.S.W., is projected. Principal features of the proposals are as follows: A double track outer-circle railway connecting with the city railway between Circular Quay and St. James' stations by means of two junctions, and proceeding through the Domain, in tunnel and open cuttings, to the Domain (open-air) station; thence in a south-easterly direction on viaduct over Woolloomooloo to Darlinghurst to Glenmore Road station. On leaving this station the line curves eastwards to Paddington, Edgecliff station, Bondi, Waverley, Coogee, Daceyville Rosebery, Waterloo, and through Alexandria to a junction with the existing railway system (Illawarra branch) at a point south of Erskineville station. An inner-circle railway for the holiday traffic to the Showground, Cricket Ground, and Randwick Racecourse connecting with the city railway between Town Hall and Central Station, is also involved. Between Daceyville and Rosebery stations two sidings, each 4,000 ft. long, to store trains to cope with the holiday traffic, have been provided. The total length of the outer-circle railway, inclusive of sidings for the storage of trains, is 10 miles 56 chains of double track, and of the inner-circle railway for holiday traffic 7 miles 32 chains, or 18 miles 8 chains of double track in all. The ruling grade is 1 in 40, and the sharpest curve is eight chains' radius. A double track loop railway having junctions with the proposed city railway is proposed for the western suburbs. Across Darling Harbour this will involve a high level cantilever bridge, providing for railway, vehicle, and pedestrian traffic, with a minimum headway of 170 ft. above high water. The total length of the railway is five miles 27 chains of double track. The ruling grade is 1 in 30, and the sharpest curve is 8 chains radius.

* * *

Great anthracite coal deposits have been discovered in the territory through which the Grand Trunk Pacific Railway runs in British Columbia. Mr. D. A. Thomas, the Welsh coal magnate, is credited with the intention of making an early start on the mining operations in the Groundhog district, which is estimated to contain 1,141,444,000 tons of coal. Plans have been made for a short line of railway from the coal fields to Nasoga Bay, fifty miles north of Prince Rupert. The product in the Groundhog district is said to be the only hard, smokeless, steam anthracite coal in the world outside of Wales, Pennsylvania and West Virginia. The opening of the Panama Canal will enable naval and other vessels using hard coal to come through the Canal with a small amount of fuel in their bunkers and replenish their supplies at Prince Rupert or Nasoga Bay with coal from the British Columbia mines.

* * *

The Grand Trunk Pacific Railway have instituted regular passenger train services between Winnipeg, Edmonton and Prince George to Prince Rupert, the new Pacific port of so much promise. Up-to-date dining, sleeping and day coach accommodation in connection with these new services is available.

Digitized by Google

PRIOR to the departure of Lord Gladstone as Governor-General of South Africa, apart from recognition he gave to various institutions and railway officials, one of the Maritzburg engine-drivers, Mr. G. Brown, or 36, West Street, had a personal letter from his lordship, expressing his thanks for services rendered during his train journeys in Natal. Lord Gladstone wrote :—"I have not fogotten the enginemen who ran my train for nearly 40,000 miles with an efficiency that cannot be surpassed. I wish it was in my power to express my thanks to you all individually and make adequate recognition of your services. I hope this will be taken as the sincere expression of my gratitude to the drivers, firemen, and guards to whose excellent services I owe so much."

* * *

THE resignation is announced of Mr. B. B. Kelliher, Chief Engineer of the Grand Trunk Pacific Railway. The circular issued by Mr. Morley Donaldson, Vice-President and General Manager of the line, states that Mr. H. A. Woods, as Assistant Chief Engineer, will assume charge of the Engineering Department of the Railway, with headquarters at Winnipeg. Mr. Kelliher's health has not been satisfactory for some time past and he has, therefore, asked to be relieved of his duties in order that he may seek a complete rest. Few men have had such a strenuous career. For 30 years Mr. Kelliher has been engaged in railway construction and is to-day recognised as one of the foremost mountain engineers of his generation. Born in Ireland and educated at Dublin University, Mr. Kelliher, after serving as an apprentice to a civil engineer in Dublin and being engaged on the surveys for the Mitchellstown and Fermoy and the Galway and Clifton Railways, proceeded to the United States. From 1886 to 1890 he was with the Union Pacific Railway, and 1890 to 1896 was Assistant Engineer of the Northern Pacific Road on the Cascade and Pacific Divisions. After further experience as Division Engineer of the Oregon Short Line he was chosen for the difficult task of locating a line through the mountains of Colorado from Denver to Salt Lake City for the Denver North-western and Pacific Railway, joining the Grand Trunk Pacific on the completion of this work as Division Engineer at Winnipeg.

* * *

IN the Russian "Government Gazette" it is stated that late in June a party of Russian engineers reached Enseli for the purpose of examining the proposed railway route from Enseli to Resht, and thence on to Kasvin. The survey is being conducted under the guidance of the engineer Yarosh. The proposed line is to serve as an extension of that already selected from the station of Alyat, which is near Baku on to Astara and thence along the shore of the sea to Resht. The Enseli-Resht-Kasvin route, the length being 224 versts, will follow the existing paved road crossing the high Elburz mountain range near the postal station of Kuin. The projected railway from Alyat station to Kasvin, about 600 versts long, is to connect Central Persia with Russia. There is a good paved road from Kasvin to Teheran—distance, 136 versts. The most important section is that connecting Enseli and Kasvin, as this gives an outlet to the sea to the richest provinces of Persia—Chamse, Kasvin, and Hamadan, which will facilitate the transport of Russian goods into Persia.

Digitized by Google

The Manufacturer's Miscellany.

WE are asked to point out that when describing the new electric rolling stock for the London and North Western Railway last month, it was incorrectly stated—the error was not ours!—that "Uralite" packing pieces are fitted under the coach bodies. The material employed is "Uacolite," one of the specialities of Bell's United Asbestos Co., Ltd., and is used not only for the cars described last month, but also for the vehicles under construction at Wolverton and by private firms for the extended electrification scheme in progress.

* * *

MESSRS. JOSEPH KAYE & SONS, LTD., Leeds, have recently had repeat orders for their famous patent automatic wedge locks, sliding door latches, etc., from the following railways: Great Eastern, Lancashire and Yorkshire, London and South Western, Midland, North Eastern, Great Southern and Western, Midland, Great Western and South African. At the time of writing the firm have in hand about 2,000 wedge locks and a large quantity of other railway fittings. Messrs. Joseph Kaye & Son, Ltd., do not confine their activities to railway requisites. In addition to 7,000 of their patent seamless oil cans recently delivered to the British Navy, they have now received orders for the immediate delivery of 3,000 from the War Department.

* * *

THE secretary of the Central Argentine Railway, Mr. E. Fighiera, contradicts the statement made by a Darlington correspondent to *The Times* that a large number of passenger carriages for its new electrified service, originally placed with the Hannoversche Wagonfabrik, has now been awarded to the Metropolitan Amalgamated Railway Carriage and Finance Company (Limited), of Birmingham. He adds that no orders for coaching stock have been placed by this company in Germany and that no tenders were invited from that country. The whole of its electrified coaching stock was purchased in Great Britain.

* * *

AN organisation has been formed to promote the interests of the railways in Great Britain and Ireland in matters connected with the purchase, manufacture, sale, storage, and distribution of stores and materials. Designated the Railway Stores Superintendents' Association, its objects will be attained by the interchange of information respecting markets, conditions of purchase, and the reading and discussion of papers on subjects connected with the management of railway stores departments. Mr. W. H. Stanier, Great Western Railway Stores Superintendent, has been elected Chairman, and Mr. C. A. Plaister, chief clerk Great Western Railway Stores Department, Swindon, has been appointed secretary and treasurer.

* * *

A CONTRACT for 27 open lattice type girder bridges of various dimensions ranging up to maximum lengths of 45 metres, required in connection with the extension of the northern section of the Royal Siamese State Railways, has been awarded the Cleveland Bridge and Engineering Company. The officers of the Royal Siamese State Railways are largely of German nationality, and hitherto considerable quantities of steelwork and rolling-stock have been supplied from Germany, but the contract in question was open to tender only from leading British and American structural engineering firms.

* * *

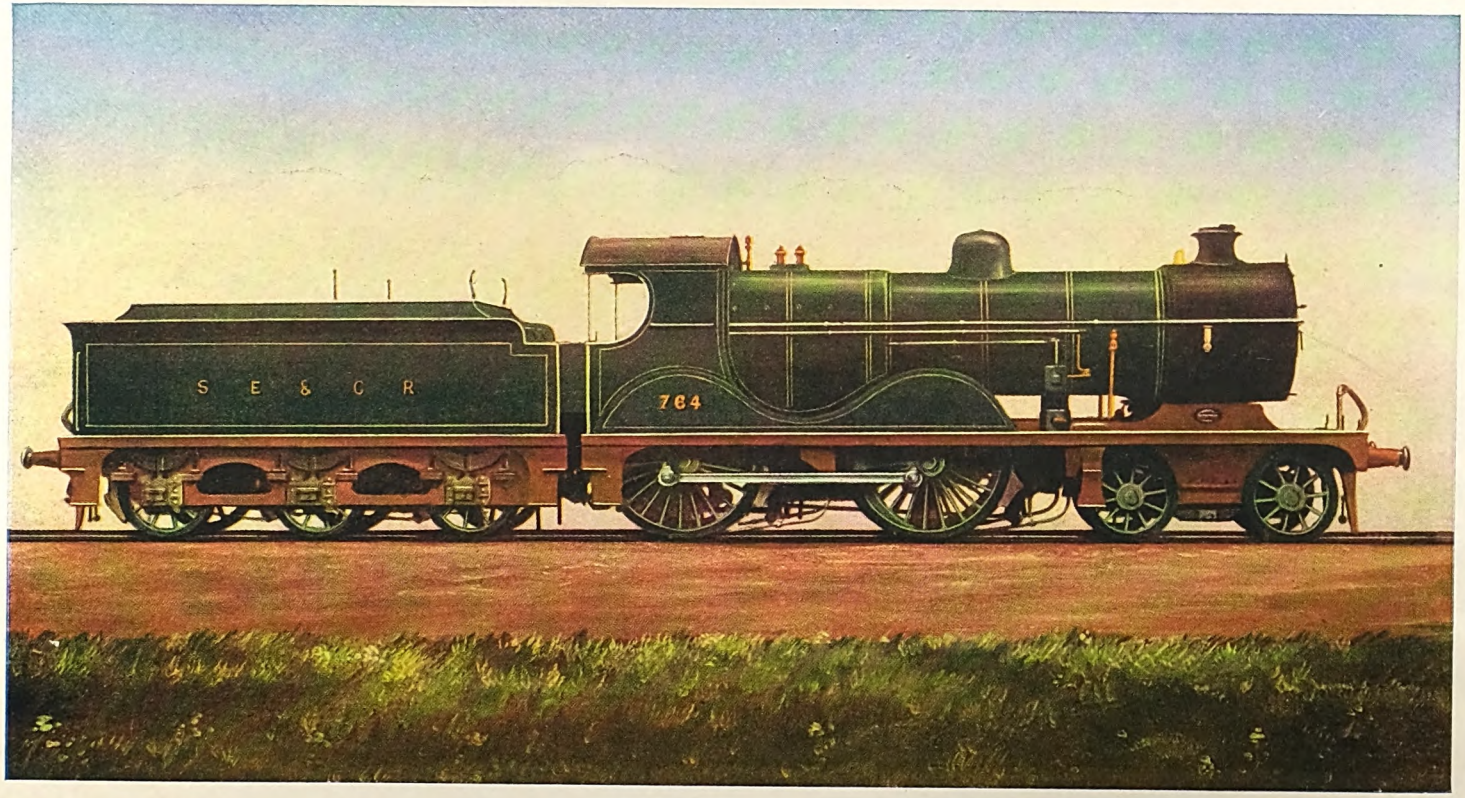
THE Osram Lamp, whose production equals 60 per cent. of the total metal filament lamp trade of the United Kingdom, has been charged with being a German concern. In point of fact, it is manufactured at the Hammersmith works by an entirely British staff of 1,500 hands, the proportion of foreign workmanship involved (from Holland) being a bare 4 per cent., and even this is being reduced. The origin of the metal filament lamp is an Austro-German invention. When it was little further than the experimental stage the General Electric Company acquired the British patents, and established in this country the metal filament lamp industry. A subsidary company was formed to acquire the patents and run the factory, and the money subscribed for the purpose was entirely British, as is the acting directorate and the whole of the staff. The original patentees, however, accepted shares in part payment, and this is the only way in which Germany and Austria are interested. For some time before the war broke out the whole of the consumption of the country was supplied from the Hammersmith factory, with the exception of a few lamps of entirely new or quite special types. The Company stands alone amongst lamp makers in having its own glass factory, at Lemington-on-Tyne.

* * *

THE Portuguese State Railways contract, which was secured during the early part of this year by the Germans, has, owing to the latter not being able to execute it, now been recovered by the North Walbottle Coal Co., Ltd., who have been successful in securing all the contracts made by these railways for the supply of their locomotive requirements during the previous few years.

Digitized by Google

Digitized by Google



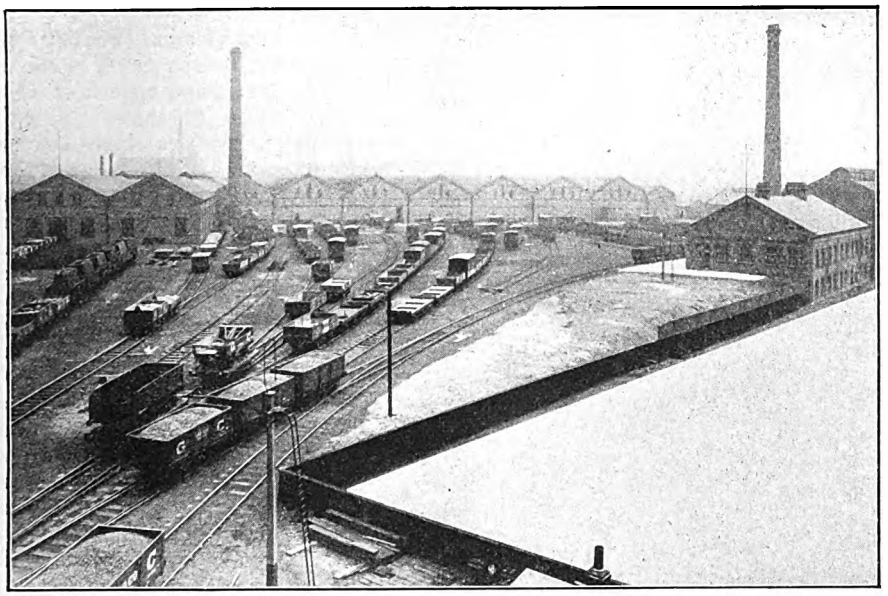
FOUR-COUPLED SUPERHEATER EXPRESS LOCOMOTIVE: SOUTH EASTERN AND CHATHAM RAILWAY.

Designed by Mr. R. E. L. Maunsell, Chief Mechanical Engineer. Built by Messrs. Beyer, Peacock & Co., Ltd.

Cylinders: 20½ in. diam., 26 in. stroke. Coupled wheels: 6 ft. 8 in. diam. Steam pressure: 160 lbs. per sq. in. Heating surface—tubes, 1252 sq. ft.; firebox, 160 sq. ft.; superheater, 319 sq. ft; total, 1731 sq. ft. Grate area: 22·5 sq. ft. Adhesion weight: 37·7 tons. Weight of engine in working order: 57 tons 9 cwt. Weight of engine and tender in running condition: 97 tons 15 cwt.

Published by "THE RAILWAY MAGAZINE."

Digitized by Google



GENERAL VIEW OF YARD AT WEST END, SHOWING PART OF THE RESERVOIR.

Dukinfield Carriage and Wagon Works: Great Central Railway.

By J. F. GAIRNS.

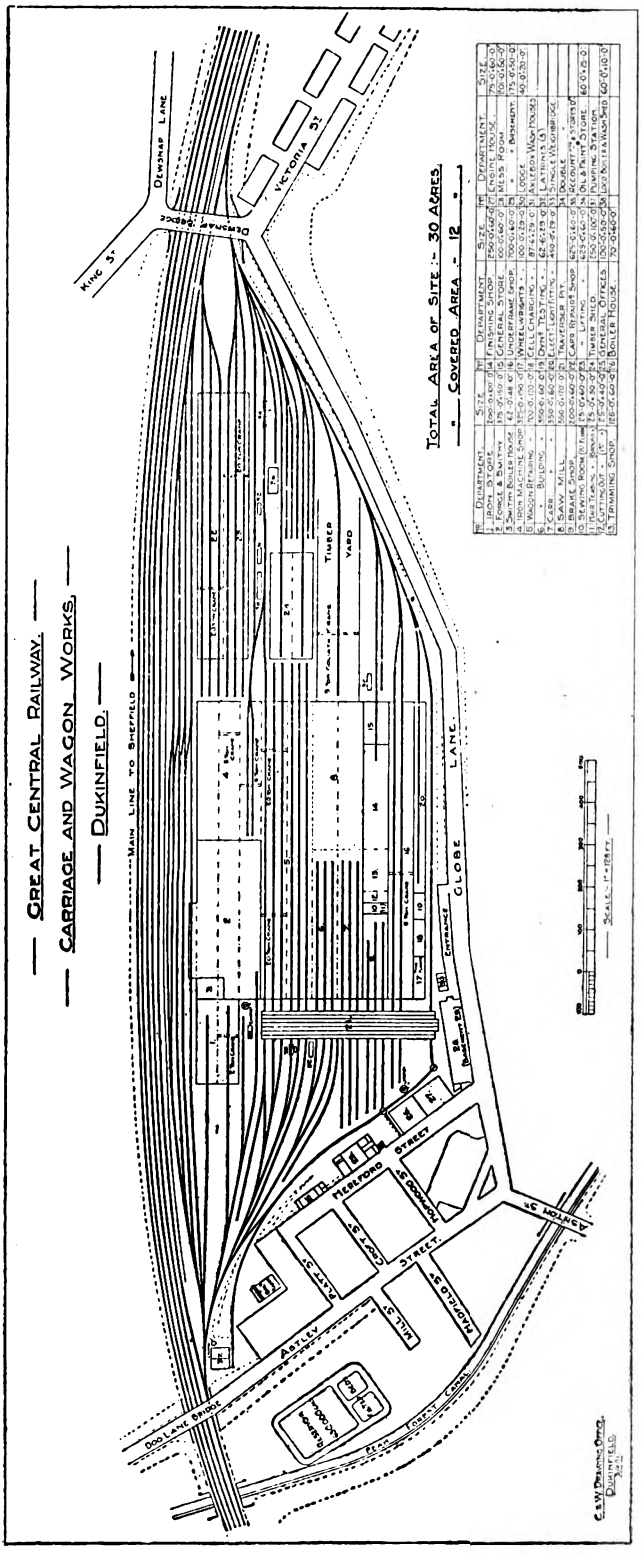
IN the November RAILWAY MAGAZINE I had the pleasure of describing the Gorton Works of the Great Central Railway, and references were made then to the transfer of carriage and wagon work to new premises at Dukinfield, owing to the impossibility of extending the accommodation at Gorton, though additional room was urgently wanted in all departments. Therefore the Directors decided to transfer the construction and repair of carriages and wagons in order that the buildings hitherto reserved for this purpose could be utilised for repairs to locomotives. A site at Dukinfield, about six miles east of Manchester (London Road), adjacent to the Company's main line, covering an area of 29½ acres, was selected for the erection of new carriage and wagon works.

The contract for the construction of the works was entrusted to Messrs. Craven & Markham, engineers, of Manchester and Chesterfield, building operations commencing in the early part of 1906. On completion of the various buildings, the machine tools and other appliances used at Gorton for carriage and wagon purposes were transferred to Dukinfield, and in addition a large number of modern high-speed machine tools have been installed to facilitate rapid and economical production. The result is that these works now rank among the most modern and best equipped of their class. They have now been in operation for about four years, and most of the present standard classes of passenger, goods, and mineral rolling stock have been constructed there.

As already mentioned, administration is in the hands of Mr. J. G. Robinson, as Chief Mechanical Engineer, Mr. J. A. Adey occupying the post of Works Manager, assisted by Mr. H. E. Lord, who also has charge of the carriage and wagon drawing office, and by Mr. Douglas R. Edge.

Altogether about 1,400 men and a number of girls are employed at Dukinfield, and the works, by virtue of their modern construction and equipment, and the fact that they were erected on a clear site so that original conditions offered no restricting influence, rank among the finest and most up-to-date of their class in the United Kingdom. In addition to new stock, some 400 passenger

Digitized by Google



vehicles and about 3,000 goods vehicles receive more or less extensive repairs each year. The Cheshire Lines Committee's carriages and wagons are also built and repaired here, while in turn vehicles belonging to the Manchester, South Junction, and Altrincham Railway receive attention, both as regards new construction and for repairs.

Located about half a mile on the eastern side of Guide Bridge station, and about equidistant from Dukinfield and Hyde Junction stations, the works are placed alongside the main line on the down side, and consist mainly of one large block of buildings accommodating shops numbered from 1 to 20 on the plan reproduced on this page, with the carriage repairing and carriage lifting shops in another large building, and timber sheds and a few other divisions conveniently placed on the area utilised. Of the 29½ acres representing the works area, about 12 are covered with buildings. A comprehensive system of railway tracks serves the works area, and throughout the various shops narrow gauge trolley tracks as required. Connection with the running lines is available at both ends of the works area, but most traffic movements of vehicles brought into or leaving the works is arranged at the eastern end, the reception lines shown making connection with the running lines beyond the limits of the plan, though supplies are usually received at the western end.

The main entrance to the works is near the west end of Globe Lane, a slope of 1 in 15 leading from the entrance gate to the lodge (30) and mess rooms (28-29). The latter are contained in a fine building, 200 ft. long by

Digitized by Google

50ft. wide, with windows on all sides and a lantern roof, and divided into three sections, a workmen's mess room, with accommodation for 1,100 men; a foremen's and clerical staff mess room, with accommodation for 40 men; and a kitchen equipped with gas ovens, grills, and hot water boilers. A reading desk is provided in the workmen's mess room, and during breakfast selections from the day's news are read therefrom. Workmen using the mess room leave their food and baskets in the room before entering the lodge (30).

Along the basement of the mess room the electric, pneumatic and hydraulic mains leading from the power station to the works are laid so that any defects may be put right quickly. Between the mess room and the lodge there is a large gate used for vehicular traffic to the works.

The lodge (30) is a building 40 ft. long by 20 ft. wide, lighted by windows on the north and south sides, with two passages for workmen entering and leaving the works. On each side of both passages time checks for 500 workmen can be given out or taken in expeditiously. Each workman on entering the works is given a check which he retains until he leaves the works, when it is given up. Before starting and when leaving work each workman has to register his time on time recorders which are conveniently placed in each shop.

It will be most convenient to commence our tour of inspection from the western end, and at this stage I may express my indebtedness to Mr. S. A. Gamble, an assistant at Gorton, for his valuable services as conductor, in addition to courtesies rendered by Mr. J. G. Robinson in arranging for my visit, supplying illustrations and other material, by Mr. R. A. Thom, assistant to Mr. Robinson, and by Mr. J. A. Adey, Works Manager at Dukinfield.

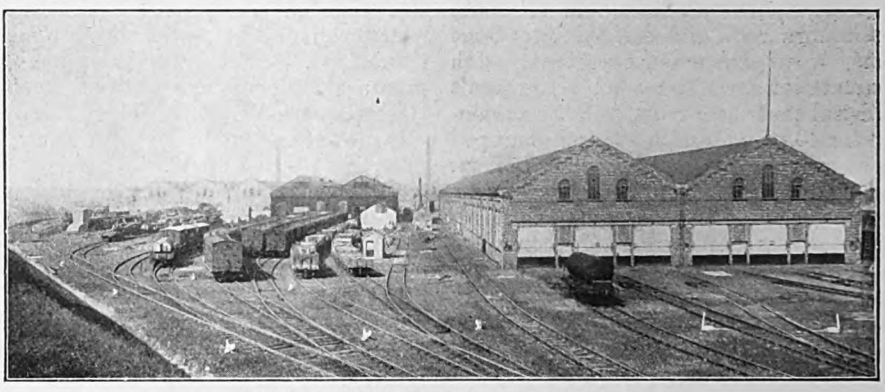
At the further end of the works area to the west is an air-compressing plant (37) for the low-pressure pneumatic signalling installation (British Pneumatic Railway Signal Co.'s system) used between Guide Bridge and London Road stations. Near by is a large reservoir, holding 600,000 gallons, fed from the Company's canal, for supplying the works with water, both as regards working requirements and in reference to the fire-protection system installed.

MR. J. A. ADEY.
Manager, Carriage and Wagon Works.

The general offices (25) are located in a neat block of buildings alongside Hereford Street. Included are the works accountants' office under Mr. Wagstaffe, with the requisite clerks, the drawing office (a small department to meet the immediate needs of the works, the main drawing office being at Gorton as already mentioned); a large general office under Mr. E. Williamson, besides the usual private rooms, etc. Alongside is an entrance for the clerks and principal members of the staff. Waiting room accommodation is also included.

At Dukinfield electric power is mainly used, and 26 and 27 are respectively the boiler and engine departments of the power house, a building 145 ft. long and 60 ft. wide. In the boiler house there are five

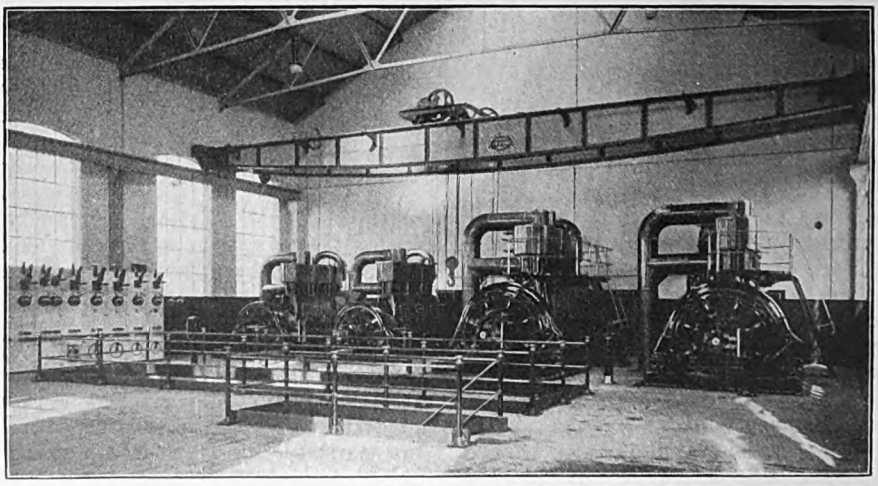
Digitized by Google



GENERAL VIEW OF EAST END OF YARD.

Lancashire boilers, fitted with Cruse superheaters, and Bennis mechanical stokers, with ash and coal-conveying plants by which coal is received from, or ashes loaded into, wagons on the transverse track alongside. In the engine room are two 400 K.W. and two 200 K.W. Westinghouse generators, of compound-wound, direct-current types, 8-poles, 240-250 volts; and each is direct-coupled to a triple-expansion, vertical steam engine of Browett, Lindley construction. The large generators run at 375 revolutions per minute, and the smaller ones at 475 revolutions.

Along one side of the engine room is the main switchboard, of Westinghouse design. This is 26 ft. 8 in. long by 7 ft. 8 in. high, supported on anchor iron framework, and containing sixteen white Sicilian marble panels, four of which are fitted to receive and twelve to distribute the current. Nos. 1 and 2 receiving panels take the current from the 200 K.W. generators, and Nos. 3 and 4 from the 400 K.W. generators. Each panel is fitted with a main double-pole quick-break switch, with feed regulator, overload switch, ammeter and plug connection to the main volt-meter. The fuses for the generators are connected to the bus bars at the back of the board; those for the 200 K.W. machines being of 1,200 amperes, and for the 400 K.W. machines 2,500 amperes carrying capacity. The field resistances for the 200 K.W. generators are of the spiral coil type and those of the 400 K.W. generators of the grid type. Of the distributing panels, some supply one and some two feeders, each feeder having a main double-pole quick-break switch from the bus bars, an ammeter and double-pole fuses. In addition to the double-pole fuses, overload switches are fitted to panel No. 5 supplying



INTERIOR OF POWER STATION: ENGINE ROOM.

Digitized by Google

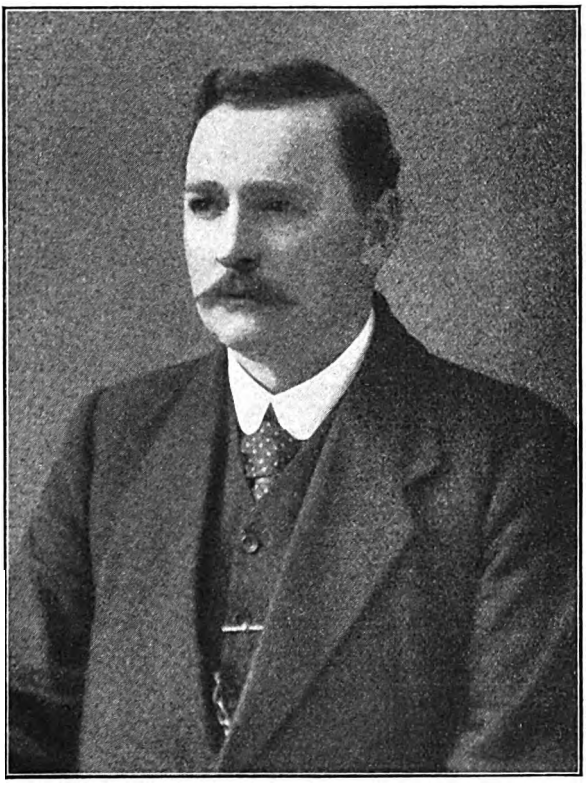
the saw mill, No. 6 serves the lifting shop and a spare feeder, and No. 7 the machine shop. Panel No. 8 has two feeders supplying light to the saw mill. No. 9 has two feeders supplying the wagon shops with light and power, and No. 10 two feeders supplying light and power to the underframe shop.

Nos. 11, 12 and 13 are at present spare, and No. 14 supplies the traversing table and general offices with power and light. No. 15 has one feeder supplying light to the power station and power to the feed pumps, mechanical stokers and economisers, and another supplying the mess room and time lodge with light, while No. 16 is at present blank.

Panel No. 6 carries a Thomson-Houston recording wattmeter. With the exception of those on panels Nos. 14 and 15, all the feeders go to a distributing board situated in the underframe shop, and thence branch off to their respective shops. The board is well lighted with lamps over each ammeter, the main voltmeter for the generators, and the line voltmeter. Four single-pole equalising switches for use when working the generators in "parallel" are mounted each on a separate cast-iron pedestal near their respective machines.

Also in the engine room may be noted twin air compressors for the pneumatic tool installation in the underframe shop, and a Tannett-Walker hydraulic pumping plant supplying hydraulic power for pressing carriage wheels on to axles.

In the basement of the engine-house are duplicate condensing equipment, the engine for operating the air pumps (Mirrlees, Watson & Co.'s, design), and centrifugal pump for circulating water, being supplied by Messrs. Drysdale & Co., Ltd. Circulating water is taken from the Great Central Company's Peak Forest Canal which passes near the works. A pump driven by an electric motor provides a duplicate circulating means. Weir pumps are used for feeding the boilers. Also in the basement may be noted a Baker oil separator, oil storage tanks, and a small shop for engine room repairs. The engine room itself is served by a 10-ton overhead crane. Outside the building is an air storage drum for the pneumatic plant.

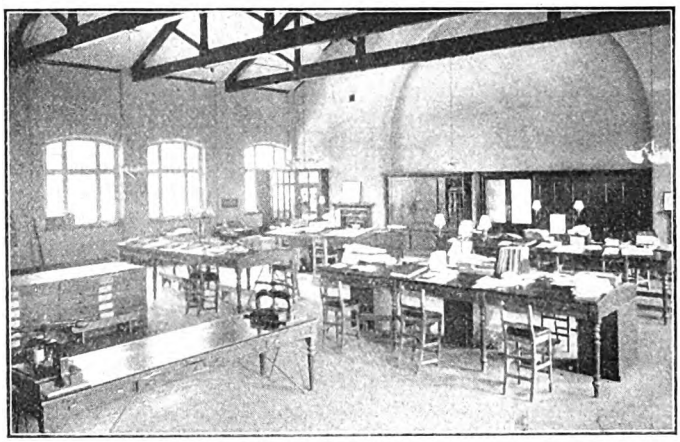


MR. H. E. LORD.
Assistant Manager, Carriage and Wagon Works.

The main block may now be visited. This is a splendid modern building 700 ft. long and 539 ft. wide, with the iron store (1) extending its length on the northern side. An electric traverser of Appleby design, and capable of taking the largest vehicles in traffic, serves nearly the whole width, commencing with the railway track alongside the Globe Lane boundary, by which vehicles are largely transferred to or from the eastern portion of the works.

The traverser is 66 ft. long, having a carrying capacity of 45 tons at five miles per hour. For hauling vehicles on and off the traverser, a capstan, having a periphery speed of 200 ft. per minute, is driven from the travelling gear by cast steel bevel reductions and clutch gear. Current is collected from bare wire overhead leads by means of a collector pole fitted to the roof of the housing.

Digitized by Google

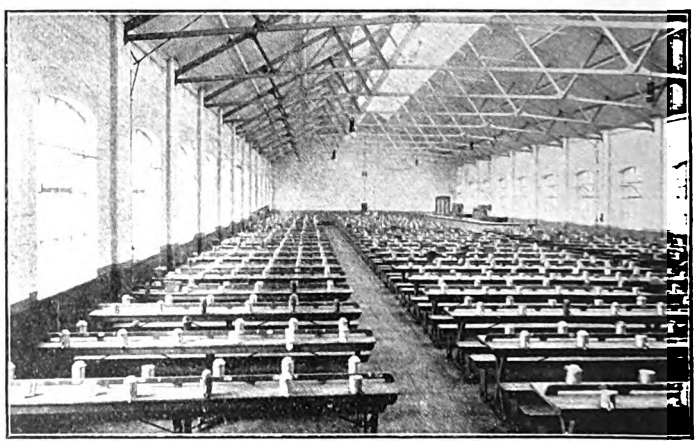


INTERIOR OF GENERAL OFFICE.

The iron store (1) is in two bays, each 50 ft. 3 in. wide by 198 ft. 6 in. In one bay is a Vaughan two-ton three-motor electrically driven overhead travelling crane. The other section deals mainly with springs, bolts, nuts and smaller items. Alongside is a boiling bosh (31) for cleaning axle-box parts.

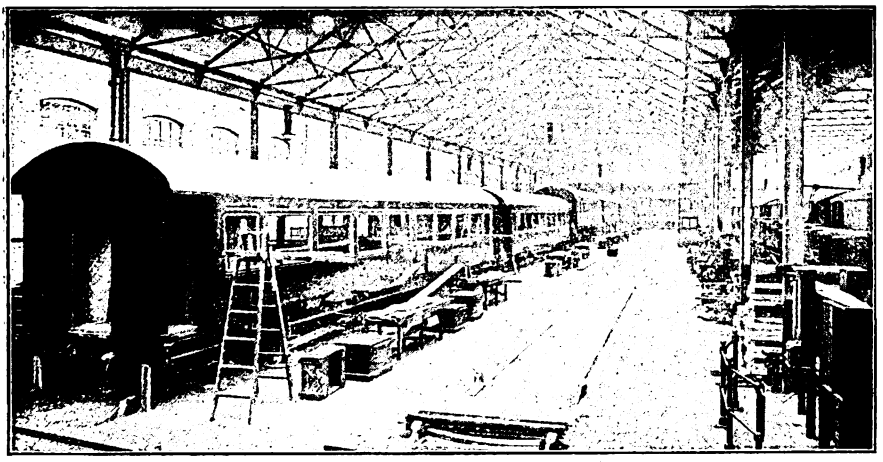
The forge and smithy (2) is 375 ft. long and 150 ft. wide. In one corner is the smithy boiler-house (3), containing two Lancashire boilers fired through a destructor.

The forge and smithy consists of three bays, one on the railway side 50 ft. 3 in. wide, a centre bay 50 ft. wide, and the third 43 ft. wide. Brick flues are built under the floor level, to convey the gases from the smithy fires and furnaces to the large chimney, 150 ft. high by 6 ft. diameter at the top, outside the building; inside the flues the blast pipes for the flues and furnaces are laid. The boiler house (3) is 48 ft. 10 in. wide by 62 ft. long, and is partitioned off from the smithy and forge. Suitable coal drops are provided outside the smithy wall facing the railway. In the boiler house are two Lancashire type boilers. The blower house, 33 ft. long by 28 ft. wide, is also partitioned off from the forge and smithy. Inside the blower house there are two No. 6 improved Roots blowers, each driven by a 50 H.P. motor through reduction gear, with Thwaite's system of automatic pressure control varying speed. In the bay adjoining the wagon repair shop a complete plant for the manufacture and repair of laminated bearing and buffing springs is installed, consisting of a punching and shearing machine, nibbing and spearing machine, vertical drilling machine, and a hot sawing machine, all driven from a line shaft which is driven by a 40 H.P. motor. Also may be noted a steam scragging machine, testing machine, an eight-door coal-fired spring-plate furnace, a six-door spring furnace, eight spring-fitting plates, two large tempering tanks, a coal-fired hooping furnace, hydraulic hooping press, a hydraulic spring buckle removing machine, a 5 cwt. steam hammer and two smith's hearths for spring back making. Beyond the spring-making plant there are a number of nut and bolt making machines with suitable furnaces, also a large heading and forging machine. A Ferguson oil furnace is used for heating stock to feed the machine. A portion of this bay about 60 ft. long is used as a grinding shop for grinding forgings previous to their being delivered in the adjoining iron machine shop. In the centre bay there are 25 smith hearths, four 5 cwt. and one 7½ cwt. steam hammers, also a 7½ cwt. pneumatic power hammer which is quite as powerful as an ordinary steam hammer of equal falling weight when working with a steam pressure of 60 lbs. per sq. in.;



INTERIOR OF MESS ROOM.

Digitized by Google



CARRIAGE BUILDING SHOP.

a double-acting pump, motor-driven through spur reduction gear, supplies compressed air at the top and bottom of the hammer cylinder for each stroke of the hammer. This hammer is specially useful when steam from the smithy and forge boilers is not available. In the forge there is one 50 cwt. and one 15 cwt. arch-form steam hammers, one 15 cwt. and one 10 cwt. "Rigby" type steam hammers; also a 100-ton hydraulic forging and flanging press, with suitable furnaces and hand jib cranes. Beyond the forge in the same bay is the stamping shop; the stamps are arranged in two batteries, one battery consisting of one 5 cwt. and one 7 cwt. steam-driven stamp, and the other battery of one 10 cwt., one 15 cwt., and one 25 cwt. steam-driven stamp. These stamps are fed from four large enclosed hearths and one oil-fired furnace.

The iron machine shop (4) is beyond the east end of the smithy and forge, and consists of three bays each 325 ft. long by 50 ft. wide. The south side of the shop is open to the wagon-repairing shop (5).

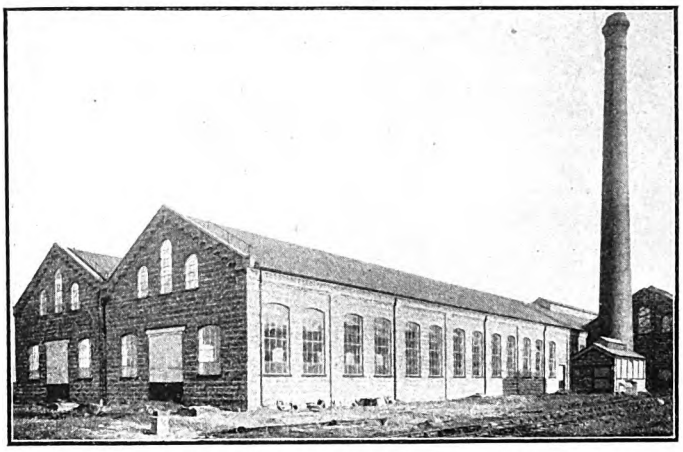
A section is used as a nut and bolt shop, and two Kendall & Gent multiple tapping machines, a group of duplex screwing machines, several Alfred Herbert automatic machines, a Holroyd screw-milling machine, and a large duplex screwing machine for buffer ends, may be specially mentioned.

The tool room and millwrights' section is 48 ft. 3 in wide and 52 ft. long. The tool stores is 48 ft. 3 in. long and 16 ft. 10 in. wide; and the brass shop is 90 ft. 5 in. long and 20 ft. 4 in. wide. These shops are partitioned off from the machine shop. In another section work such as water tanks, rotary pumps, etc., is done. There are also benches as convenient.

At the other side of the foreman's office in the same bay there are grouped a wagon brakeshaft machine and four axle lathes. The brakeshaft machine has been specially designed for completely finishing every operation required on a brakeshaft,

MR. DOUGLAS R. EDGE,
Carriage and Wagon Department.

Digitized by Google

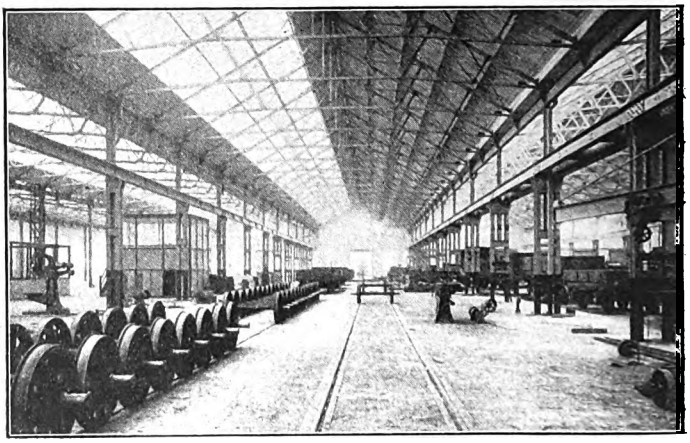


IRON STORE AND SMITHY CHIMNEY.

i.e., turning, milling, drilling and keyseating. The carriage and wagon ending and centreing lathe has mounted on the bed two geared hollow headstocks having variable relative position to each other, and both being driven from a central driving shaft which receives motion through suitable reduction gear from a variable speed motor placed at one end of the bed. The carriage and wagon axle-roughing lathe has been specially designed for the use of high-speed cutting tools. The axle-forming lathe has 12-inch centres, and is capable of forming the centre portion of axles up to 9 ft. long by 7 in. diameter. Opposite the axle lathes in the middle bay are a Kendall & Gent high-speed vertical milling and profiling machine, one 12-inch slotting machine, a carriage and wagon axle-box milling and drilling machine, an Asquith three-head high-speed radial drilling machine, a double spindle vertical drilling machine, and a number of ordinary vertical and horizontal drilling machines. The vertical milling and profiling machine is specially designed for die sinking.

The carriage and wagon axle box milling and drilling machine is of Holroyd design and has four spindles each 3 in. diameter for carrying milling cutters or drills as required. The three-head radial drilling machine has a bed 25 ft. long on which three standards, each having self-acting traverse along the bed, are mounted. The other drilling machines are of ordinary construction, belt driven from two line shafts each driven from a 20 H.P. motor. The machines in this bay are served by a 5-ton 3-motor electrically driven overhead travelling crane, by S. H. Heywood & Co., of Reddish, hoisting speed 20 to 35 ft. per minute, cross traversing 100 to 130 ft. per minute, and longitudinal travelling 300 to 360 ft. per minute.

In the wheel shop constituting the sunken bay of the machine shop there are a number of wheel turning lathes, tyre boring lathes, axle burnishing lathes, carriage wheel balancing machine, keyway milling machine, hydraulic wheel presses, and tyre furnaces. Some of the motor-driven machines are fitted with Vickers, or "Electromotors" system of variable control. Many of the machines are of Craven design, but special mention may be made of a Whitworth ending and centring lathe, a Holroyd brakeshaft milling, drilling and turning machine, and a Craven centre-drive wheel lathe. The vertical hydraulic wheel press is suitable for retyring carriage wheels without removing the wheels from the axles and will admit wheels up to 4 feet diameter between uprights; by means of a hydraulic pressure intensifier working from an accumulator pressure of 1,500 lbs. per square inch, a total pressure of 250 tons

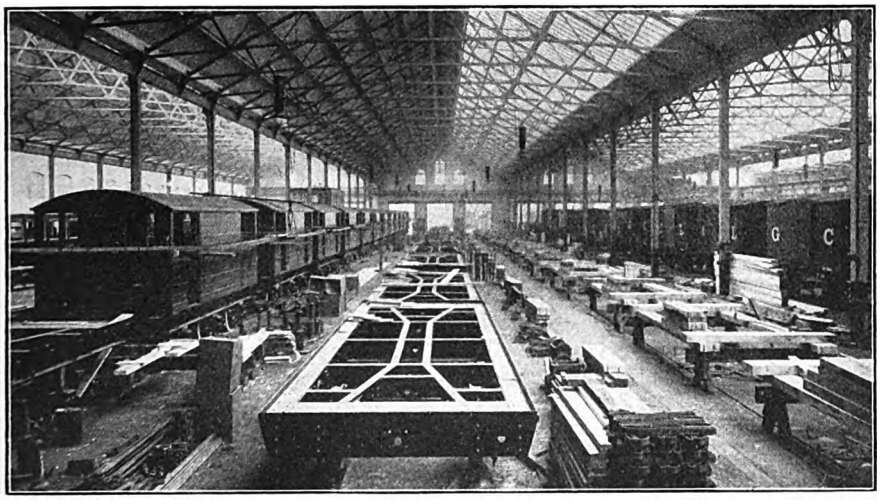


IRON MACHINE SHOP.

Digitized by Google

is obtained on the press. The 50-ton hydraulic wheel testing press is used for testing carriage wheels which have been in service, the press is arranged to give a maximum pressure of 50 tons when working from an accumulator pressure of 1,500 lbs. per square inch; the wheels of all carriages passing through the shops for repairs are tested and must withstand a withdrawal pressure of 50 tons without showing any movement on the axle. The horizontal hydraulic wheel presses are of the usual type and give a total pressure of 75 tons; each press is fitted with a single acting pump to give increased pressure for withdrawing wheels from axles when required. Tyres which require to be shrunk on the wheel centres are heated in a Ferguson oil-fired furnace. The machines in this bay are served by a Vaughan 5-ton

The carriage and wagon building shop (6 and 7) and saw mill (8) occupy the next two bays, each 60 feet wide. Outside the east end of the saw mill there is a timber yard 480 feet long served by a Craven 5-ton three-motor "Goliath" crane of open lattice type. The span of the crane is 100 feet and the height, from rail level to the underside of cross girders, 30 feet. The saw mill, a fine lofty and well lighted shop, is on the north and west sides open to the adjoining divisions. The whole of the driving is from motors below the floor, with protected shafting and belting. Shoots are provided whereby sawdust and shavings are collected in the basement into sacks. As a protective measure every motor starting stand has red and green electric lamps, the red showing automatically if anything goes wrong. At



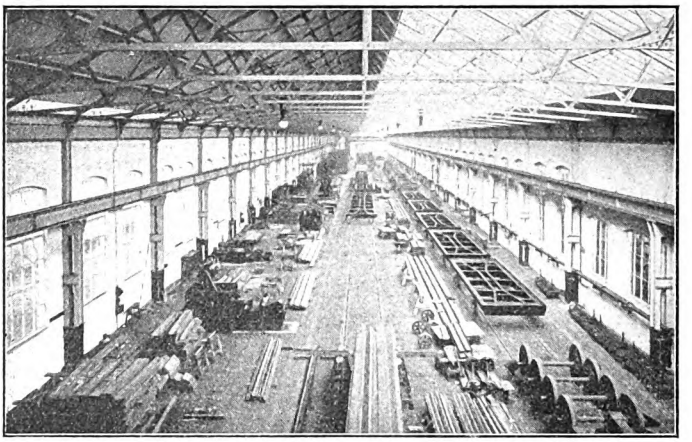
WAGON BUILDING SHOP.

electrically driven travelling crane similar to that in the adjacent bay. Special attention may also be directed to a new machine, of foreign design, recently added for rolling tyre retaining rings. The rollers are operated by an electric motor, and an oil pump supplies pressures up to 2,100 lbs. per square inch.

The wagon repairing shop (5) is in two bays, each 700 feet long by 60 feet wide, each having three running roads. One of these bays is used for light and the other for heavy wagon repairs. The bay used for heavy repairs is served by two 20-ton three-motor electrically-driven overhead travelling cranes having a longitudinal travelling speed of 300 feet, traversing 100 feet and hoisting 20 feet per minute.

the east end of the mill and parallel with the gable wall are two horizontal panel saws, two vertical log frame saws, horizontal log band saw and a circular rack saw. One of the horizontal panel saws is capable of sawing logs up to 3 feet square by 35 feet long and the other up to 4 feet 6 inches square by 30 feet long. Each of the saws is belt driven by a 30 H.P. motor placed in the basement. The vertical log frame saws can deal with logs up to 3 feet square by 60 feet long, each being belt driven by a 50 H.P. motor placed in the basement. The horizontal log band saw, for cutting logs into planks for panel work, is a remarkable machine supplied by Messrs. A. Ransome and Co., Ltd., of Newark. It is electrically driven by a 33 H.P. motor, the armature of which is fixed

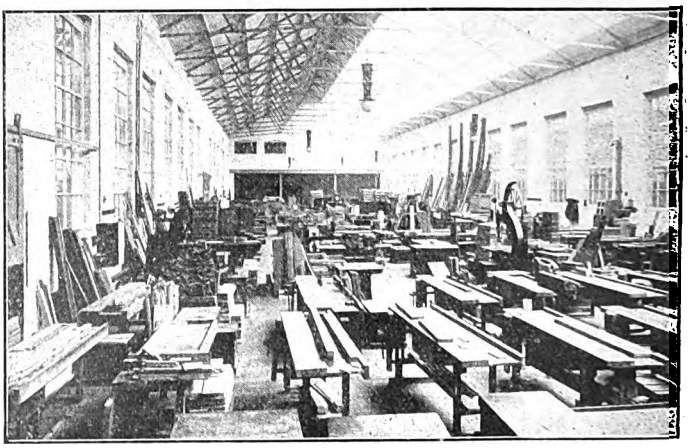
Digitized by Google



STEEL UNDERFRAME SHOP, LOOKING WEST.

to one of the shafts carrying the saw pulleys. The pulleys are 5 feet diameter and suitable for carrying saws up to 6 inches wide, running at 7,500 feet per minute. The various motions of the machine are controlled by means of three hand levers fitted to a cast iron frame placed in a convenient position for the operator, one lever for starting, stopping and reversing the log carriage, one for raising and lowering the saw pulley carriage, and the other for varying the rate of feed and the speed at which the saw is lowered or raised. The saw is started and stopped by means of the starting gear of the motor. A roller table for the logs extends outside the building. This machine will feed up to 100 superficial feet per minute.

The circular rack saw bench carries a saw 4 feet diameter mounted on a mild steel spindle direct coupled to a 25 H.P. compound wound motor running at 850 revolutions per minute. The travelling table is 22 inches wide by 41 feet long, fitted with a cast iron rack geared with a steel pinion on a feed shaft giving a variable forward traverse from 4 to 60 feet per minute and return at 135 feet per minute. Beyond the runways of the log-frame saws there is a 48 inch traversing cross-cut saw belt, driven at 900 revolutions per minute from a 15 H.P. motor placed in the basement. Three high-speed roller feed planing machines, one capable of planing seasoned oak or teak on all four sides at one operation up to 16 inches by 7 inches, with variable feed from 16 to 125 feet per minute; one capable of planing, tonguing and grooving, beading or bevelling up to 12 inches by 6 inches and the other up to 12 inches by 5 inches, each having variable feed from 16 to 150 feet per minute. Each machine is independently driven by 50 H.P. motors. In transverse alignment with the roller planers are two circular drag saws, each 30 inches diameter, running at 1,000 revolutions per minute, driven from a line shaft in the basement. For milling wagon scantlings there are grouped two multiple-spindle boring machines, two vertical tenoning machines, and two vertical hollow chisel mortising machines. Wagon solebars, longitudinals, diagonals, headstocks, etc., after being planed, are fed through the boring, tenoning and mortising machines in sequence and then passed forward into the wagon building bays ready for erection. Each multiple boring machine carries four boring spindles, capable of boring holes up to 4 inches diameter in timber up to 16 inches square by 25 feet long with a cross traverse of 14 inches. The travelling carriage is made of mild steel joists fitted with power and hand feed, the fences are adjustable against which the timber is held by quick acting hand feed cramps. The mortising machines are each



CABINET SHOP.

Digitized by Google

fitted with two boring spindles capable of boring holes up to 4 inches diameter and one square hollow mortising chisel capable of making mortises of any length up to 2½ inches wide. The chisel ram has a vertical range of 17 inches and mortises of a maximum depth of 6 inches can be cut at one operation. The mortising ram is controlled by a hand lever, by means of which the ram can be started, stopped or reversed at any point of its stroke. The carriage is built of mild steel sections and is controlled by power and hand feed.

There are four tenoning machines suitable for cutting single and double tenons, the spindles on which the cutter blocks are mounted run at 2,500 revolutions per minute, each block carries two cutters set to operate with a shear-cut. Double tenons are cut by means of grooving or milling cutters carried on a vertical spindle set in advance of the horizontal cutters. There are a number of double-spindle circular moulding and shaping machines, circular saw benches, four-cutter planing and milling machines, panel planing and scraping machines, band saws and jack planes of the ordinary types, which do not require further mention.

In an enclosure is a tool room 65 feet long by 25 feet wide, provided with a band saw lap milling machine, brazing furnace and clamp, band saw sharpening and setting machines, two scraper grinders and two circular saw sharpening machines. A tool store 25 feet long by 20 feet wide is also included, from which the various tools required in the saw mill are issued. A gallery for light wood turning lathes, 52 feet long by 10 feet wide, and a foreman's office built in timber, is placed over the tool stores, a suitable stairway giving access to same. From the office an unrestricted view of the saw mill is obtained.

The carriage building and erecting shop (7) consists of one bay 60 ft. wide by 349 ft. 3 in. long, with the wagon building shop 6) alongside in a similar bay, also 60 ft.) wide. Both the carriage and wagon building shops are lighted from the roof, similarly to the saw mill. [We may mention here that all brake vans are now equipped with salvage tool boxes, including choppers, saws, hammers and other appliances likely to be useful in case of accident.] The eastern portion of the former is used as a bogie erecting shop, both for new work and for repairs. For bogies pressed steel is now largely used, and in addition to new work done at Dukinfield, there are pressed steel bogies built by the Leeds Forge Co., Ltd., and by other firms.

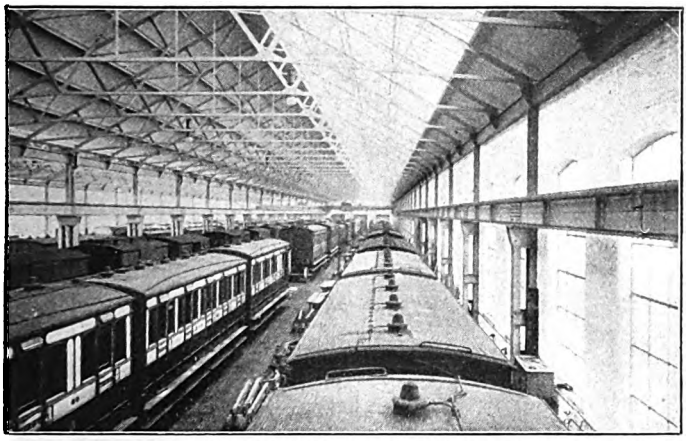
INTERIOR OF SAW MILL, LOOKING EAST.

The next bay, 60 ft. 0 in., is divided into several sections. The brake shop (9) is 198 ft. 8 in. long, and is served by three lines of rail, with inspection pits. One track is shorter than the others, to allow space for a few appliances.

Adjoining is a double-floored division, 25 ft. long. On ground level is a hair-teasing room (11), containing two machines, with sack-filling appliances and storage compartments. Above this is a sewing room (10), with sewing machines, etc., where about 12 girls are employed dealing with upholstery.

Digitized by Google

Digitized by Google



CARRIAGE LIFTING AND REPAIRING SHOPS, NORTH BAY, LOOKING WEST.

Alongside this is a cutting-out room (12), where cloth is cut to pattern. A small amount of saddlery is also done here. The latter division extends over a portion of the trimming shop (13), where cushions and upholstery are dealt with. This is 125 ft. long.

In the cabinet shop (14) bench work is largely done, but there are a few appliances, including two or three saws, a morticing and boring machine, a cramping bench, glue pots, etc. Here doors, window frames, picture frames and other details of carriage construction receive attention. This division is 250 ft. long, but a portion 62 ft. 6 in. long is divided off to serve as the polishing shop, where cabinet work is grained, varnished and polished. This range is completed by a stores (20) meeting the general needs of the works.

The steel underframe shop (16) is 698 ft. 6 in. long by 60 ft. 6 in. wide, and is lighted by windows in the wall adjoining the electric light fitting shop, and in the wall adjoining the cabinet and other shops in the same bay, also from the north side of the roof. At the east end is placed a de Bergue straightening and bending machine for straightening or bending rolled sectional material up to 12 in. by 5 in. channels. The cold iron and steel sawing machine carries a saw 30 in. diameter and is capable of sawing sections up to 20 in. by 8 in. with self-acting feed at 1½ in. per minute; the machine is direct driven by an 8½ H.P. motor. The de Bergue notching machine can deal with plates and angles up to 1 3-16th in. thick, joists from 3 in. by 1½ in. up to 18 in. by 7 in., and channels from 3 in. by 1½ in. up to 15 in. by 4 in. Short members and plates used in the construction of steel underframes are drilled by an Asquith high-speed triplex radial drilling machine; the bed is 25 ft. long, on which three standards, having self-acting traverse along the bed, are mounted. It is largely used for sectional work, such as gusset plates, and cross members.

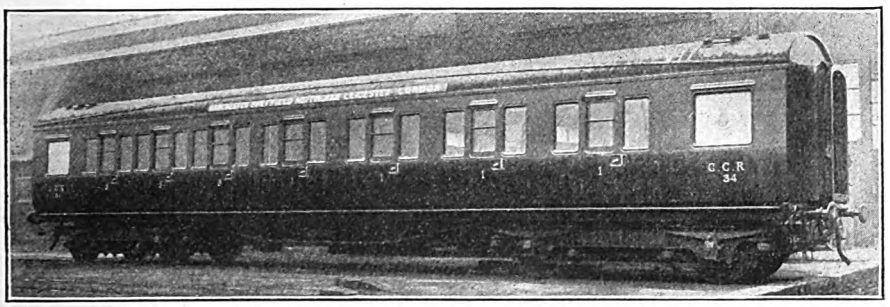
The de Bergue shearing and punching machine is specially arranged for carriage and wagon purposes, and is capable of shearing steel plates up to 1¼ in. thick at a distance of 18 in. from the edge, flats any length up to 6 in. by 1¼ in., and angles up to 6 ft. 6 in. by ¾ in. By means of an adjustable table, rivet holes can be punched in the flanges of channel bars from 6 in. by 2½ in. up to 12 in. by 3½ in. Holes in racking and gusset plates up to 4 in. diameter can be punched.

For drilling solebars, longitudinals and other long members, there are two specially designed four-head high-speed drilling machines. The machine near the punch and shears, of Asquith design, has a bed 40 ft. long on which four drill headstocks are mounted, having rapid longitudinal and cross adjustment by hand wheels. Each head is driven by its own electric motor. The other drilling machine, by J. Holroyd & Co., Ltd., has a bed 42 ft. long on which are mounted four drilling heads carrying the spindle slides, having rapid longitudinal and cross adjustment by means of large hand wheels, rack and pinion. This also has separate motors for each head. The machine is fitted with ball thrust bearings, special provision being made for lubrication.

The two-head solebar milling machine (by J. Holroyd & Co., Ltd.) is specially designed to mill both ends of beams, channels or angles simultaneously; the bed is 80 ft. long, to which there is bolted a double rack for traversing the heads along the bed. On one of the pillars an angular head is bolted carrying a milling cutter 14 in. long by 5 in. diameter; this cutter is set at an angle so that the whole width of the cut does not come on the web at once. The other pillar carries two horizontal profile milling cutters 7 in. diameter by 4½ in. long for milling the flanges of beams or channels; these cutters

Digitized by Google

Digitized by Google



COMPOSITE CARRIAGE: MARYLEBONE AND MANCHESTER SERVICE.

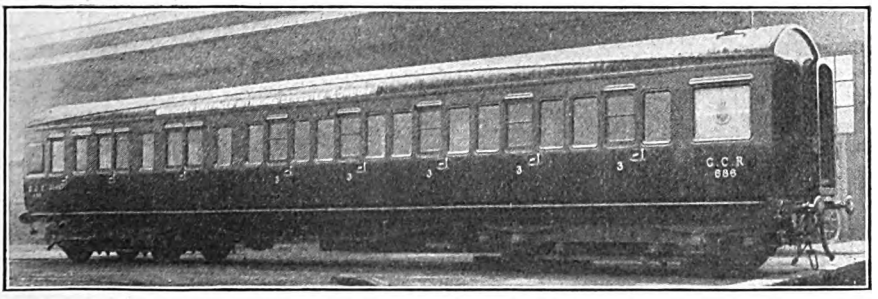
steel stanchions carrying the roof are provided with supplementary columns for carrying the runways for overhead travelling cranes in each bay. There are three inspection pits and roads in each bay, and tramways are laid between the roads to facilitate the transit of material. Along the inspection pits there are laid steam, air and vacuum pipes for testing the heating apparatus, Westinghouse and vacuum brakes on vehicles undergoing repairs. Each bay is served by two 20-ton three-motor electrically driven overhead travelling cranes.

In the timber drying shed (24) there are two bays each 50 ft. wide by 250 ft. long. The roof is carried by steel stanchions having supplementary columns in the south bay for carrying the runway for an overhead travelling crane. The building is framed in timber, the spaces between the vertical posts being fitted with fixed louvre boards for ventilating purposes; a timber gallery 18 ft. wide extends the full length of the north bay for storing panel boards. The south bay is served by a two-ton three-motor electrically driven travelling crane similar to that in the iron stores.

Outside the carriage lifting and repair shop on the south side are the boiler house (38), axle-box wash-house (31), latrines (36), oil and paint stores (36), and a 60-ton double weigh-bridge (34). The boiler house is a two-storey building 60 ft. long by 14 ft. wide; the upper floor is used as a carriage cushion wash-house, and on the ground floor are two locomotive type boilers which supply steam for heating the carriage lifting and repairing shops and paint stores, for testing heating apparatus on vehicles, and for driving a Westinghouse air pump and working a vacuum ejector for brake testing, a system of pipes for each purpose being provided along the inspection pits in the carriage lifting and repairing shop, so that any vehicle can be connected up as required. Adjoining the boiler house is a division for plumbing and odd-and-end work. The paint stores is 56 ft. long by 25 ft. wide, built of corrugated iron and steel.

Throughout the works a comprehensive system of fire mains and hydrants is installed, so that in the event of fire anywhere immediate safety measures can be at once undertaken.

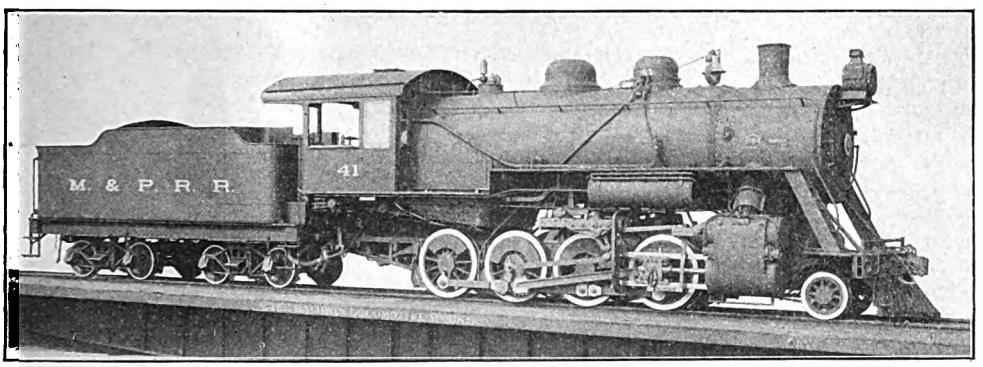
During the last few years rolling stock has been developed by Mr. Robinson to a distinctive and notable degree, and the series of photographs of the principal classes given herewith form an interesting addendum to this description of the works where they have been produced.



3RD CLASS BRAKE COMPOSITE: MARYLEBONE AND MANCHESTER SERVICE.

Digitized by Google

Digitized by Google



2-8-0 LOCOMOTIVE: MARYLAND AND PENNSYLVANIA RAILROAD.

Recent American Freight Locomotives.

EARNINGS of American Railways are chiefly dependent upon freight traffic, approximately 70 per cent. of the total operating revenue being derived from this source. Every effort has been made, especially during recent years, to move this traffic at the lowest possible cost; this being especially important because of the low rates which American railways are compelled to charge for the service rendered.

The American freight locomotive has naturally played a prominent part in reducing the cost per ton mile of moving freight. This has been accomplished, first, by augmenting the train load through the use of more powerful locomotives; and secondly, by increasing locomotive efficiency, thus reducing the fuel and water consumption per horse-power-hour developed. Liability to engine failure has also been reduced by the use of more carefully designed parts, and of materials specially selected for the work to be done. As a result, the unusually large units now in use are proving reliable in service, and more efficient than the smaller locomotives formerly employed, as they consume considerably less fuel and water in proportion to the work done.

Traffic on American railways is such that a considerable portion of it can be economically and conveniently moved in large train loads. Bulky commodities, such as coal, ore, and other classes of non-perishable freight, are moved in the heaviest train-loads permitted by physical conditions, though the minimum speeds, on the ruling grades, may be as low as six to ten miles per hour. Perishable freight is handled in lighter trains at materially higher speeds; but here, also, there is a constant tendency to increase the train load by the use of more powerful locomotives. On single track lines, such as are frequently found in the United States, the heavy train permits a maximum amount of tonnage to be handled with a minimum number of train movements, which is, of course, a special advantage where track facilities are limited.

The policy of grade reduction, which has been carried out by many American lines during recent years, has also been an important factor in raising the freight train load. This has been accomplished by a material increase in the speed at which heavy trains are handled. Such service requires the development of large horse-powers, and is being performed by locomotives having unusually high steaming capacity; as boiler power is the factor limiting the speed at which a train of given weight can be hauled.

Most of the standard heavy freight traffic on American railways is worked by locomotives having four pairs of coupled wheels. Locomotives with three pairs of coupled wheels are generally confined to fast freight service, or to divisions where the grades are relatively easy, so that the tractive force developed by a locomotive of this type is sufficient for hauling heavy trains economically. Six-coupled locomotives are also used to a large extent on short roads and branch lines, where the freight handled is miscellaneous in character and train loads are comparatively light.

Accompanying illustrations represent several types of heavy freight locomotives recently built by The Baldwin Locomotive

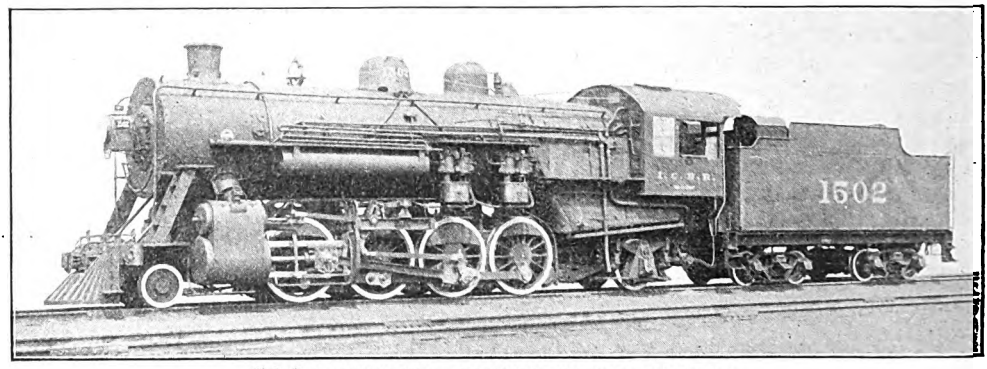
Digitized by Google

Works. The engine for the Maryland and Pennsylvania Railroad is of the " Consolidation " or 2–8–0 type. It is not an exceptionally large locomotive, as it is designed for service on rails weighing 70 lbs. per yard. This type of locomotive, introduced in 1866, has been more extensively used for heavy freight traffic in the United States than any other, although, during the past few years, it has been replaced, on many roads, by locomotives of the 2–8–2 and larger types, to which reference will subsequently be made.

" Consolidation " locomotives, with nearly 90 per cent. of the total weight on the coupled wheels, are particularly adapted to slow-speed service ; and the abandonment of this type on many roads for the heaviest class of work, has been largely due to the necessity for maintaining higher speeds, requiring greater boiler capacity in proportion to the adhesion weight.

The locomotive for the Maryland and Pennsylvania Railroad is used in slow-speed, heavy service, and has driving-wheels only 51 in. in diameter. This provides room for a wide and also deep firebox, placed above the rear pair of driving-wheels. The grate is inclined toward the front in order to secure a maximum depth at the throat sheet ; and the furnace contains a sectional brick arch supported on water-tubes. The boiler barrel has a straight top, and the dome is placed ahead of the firebox ; while the safety-valves and whistle are screwed into a separate mounting, located over the firebox.

Superheated steam has become almost universal in America for large locomotives, and the engine now under consideration is no exception to the rule. The Schmidt type of superheater, which is more generally used than any other, is applied in this case. The superheated steam is conveyed to the steam-chests through pipes which pass out through



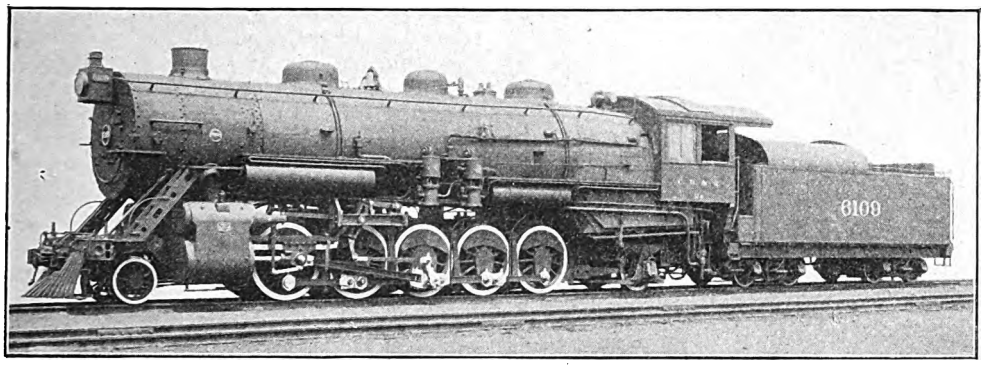
2-8-2 LOCOMOTIVE : ILLINOIS CENTRAL RAILROAD.

The first " Consolidation " locomotives had long, narrow fireboxes, placed between the rear driving-wheels. While boilers were of moderate dimensions, this construction proved satisfactory ; but as the locomotives increased in size, it became necessary to enlarge the grate area, and this was done by placing the firebox entirely above the rear pair of driving wheels. This necessarily restricted the depth of the furnace, and especially the vertical distance between the grate and the bottom row of tubes. As a result it is frequently difficult, if not impossible, to apply a brick arch ; and the arch is now generally recognized as an important aid to economy when burning bituminous coal. This reason alone has made it necessary, in some cases, to use the 2–8–2 type in order to obtain a satisfactory furnace design.

the sides of the smoke-box. This construction provides the most direct path for the steam, and also avoids the necessity of coring live steam passages in the cylinder castings. The steam distribution is controlled by central admission piston valves, 14 inches in diameter. These are driven by Walschaert valve motion, and are set with a lead of $\frac{3}{16}$ in.

This locomotive exerts a tractive force of 42,900 lbs., and as the weight on driving-wheels is 170,300 lbs., the ratio of adhesion is approximately 4. It is found an advantage, with superheater locomotives, to use a low ratio of adhesion, and work the engine with wide-open throttle and the shortest practicable cut-off. Difficulties due to excessive condensation, which frequently occur when using saturated steam at short cut-offs in large cylinders, are avoided by using superheat.

Digitized by Google



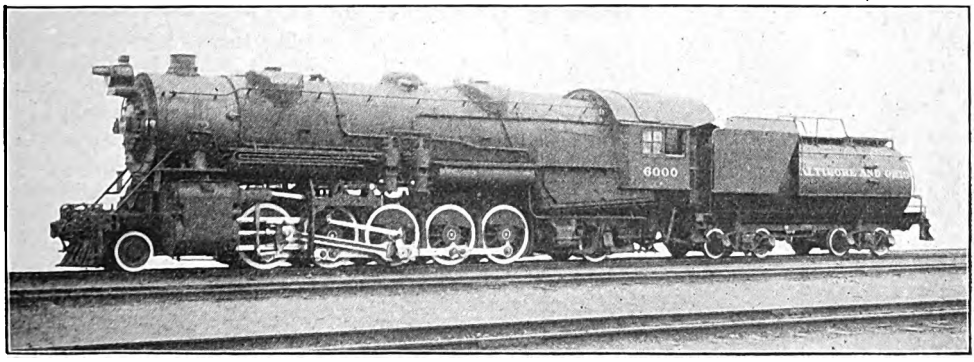
2-10-2 LOCOMOTIVE: CHICAGO, BURLINGTON AND QUINCY RAILROAD.

Locomotive No. 1502 for the Illinois Central Railroad, is of the " Mikado " or 2–8–2 type, and represents a design which is supplanting the " Consolidation " on many roads. The first locomotives of this pattern were built for Japan by The Baldwin Locomotive Works in 1897, hence the designation of the type. The firebox, in a " Mikado " type locomotive, is placed back of the driving-wheels and over the trailing truck. This allows room for a deep and wide firebox, in combination with a long boiler barrel, so that ample grate area, furnace volume, and heating surface are provided. The fact that the firebox is entirely behind the driving-wheels, instead of above them as in the " Consolidation " type, permits the use of comparatively large driving-wheels without cramping the furnace dimensions. These large wheels are used in combination with large cylinders, so that a suitable ratio of adhesion is maintained ; and the result is a locomotive of ample hauling capacity, capable of developing high horse-powers for sustained periods of time.

It is increased steaming capacity, in proportion to the adhesion, that gives the " Mikado " type a marked advantage over the " Consolidation." Two locomotives, one a " Consolidation " and the other a " Mikado," carrying equal weights on driving-wheels and developing equal maximum tractive forces, will have approximately equal hauling capacities at slow speeds. But at higher speeds, where the horse-power that can be developed is limited by the steaming capacity of the boiler, the " Mikado " type will show a distinct advantage, as it will be able to haul a heavier train than the " Consolidation " at a given speed, or with the same tonnage will make better time.

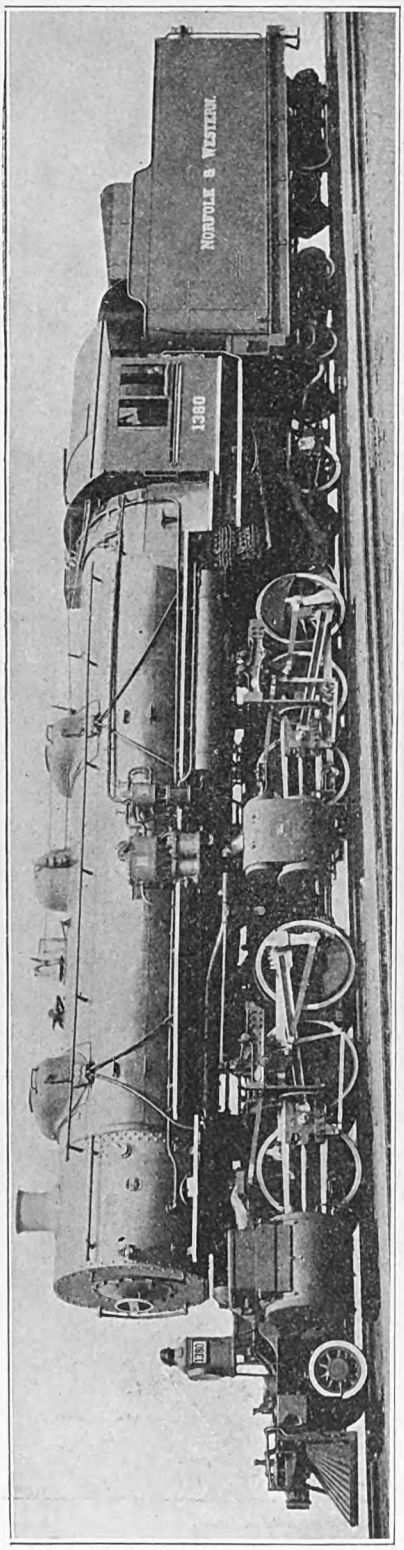
Another advantage of the 2–8–2 type, as compared with the 2–8–0, lies in the fact that, owing to the ample amount of space available for the firebox, the boiler can be designed for the use of any kind of fuel that is practicable for locomotive work. For this reason, " Mikado " type locomotives have, in a number of instances, effected substantial savings by burning low-grade fuels which were unfit for use in " Consolidation " type locomotives.

The question as to whether " Mikado " or " Consolidation " type locomotives shall be



2-10-2 LOCOMOTIVES: BALTIMORE AND OHIO RAILROAD.

Digitized by Google



2-6-6-2 ARTICULATED LOCOMOTIVE: NORFOLK AND WESTERN RAILWAY.

used to perform a given service, can of course be settled only after the operating conditions of the line have been carefully studied. Where these conditions are favourable to the use of the 2–8–0 type, there is no advantage in employing the 2–8–2, with its more complicated construction and increased total weight in proportion to weight on driving-wheels. Present conditions in the United States, however, are such as to generally favour the use of the "Mikado" class, as being better fitted for heavy duty where large horse-powers must be developed for sustained periods of time.

The locomotive for the Illinois Central Railroad is one of 200 "Mikado" engines which are operating on that system. The first of these locomotives were built in 1911. They are all of the same hauling capacity and closely similar in design, and constitute a homogeneous group of heavy freight engines which have proved exceptionally successful in service. Compared with the "Consolidation" locomotives, using saturated steam, which they have replaced, they are capable of hauling 30 per cent. more tonnage with no increase in the coal actually consumed per trip.

These locomotives exert a tractive force of 51,700 lbs., and with 218,300 lbs. on driving-wheels, the ratio of adhesion is 4·22. On a heating surface basis, the steaming capacity of the boiler, in proportion to the adhesion, is about 35 per cent. greater than a "Consolidation" locomotive. The driving-wheels are of sufficient diameter (63 in.) to enable this engine to make good time in fast freight service; while the steaming capacity is ample for such duty. In some localities "Mikado" locomotives are, in fact, being successfully used in heavy passenger service on mountain grades.

Constructive details of these locomotives present a number of interesting features. The illustration shows plainly the general design of the boiler, and the position of the firebox in relation to the wheels. The grate is placed in one plane and is inclined toward the front; while the depth of the furnace throat, measured from the under side of the boiler barrel to the bottom of the foundation-ring, is 27 in. The fire-brick arch is supported on four water tubes. A feature of the furnace equipment is a device for suppressing smoke, consisting of four steam jets on each side of the firebox. These are arranged to draw air into the furnace through 2-in. tubes which are placed in the water-legs. A device like this is found in practice to be very effective when using highly volatile coal.

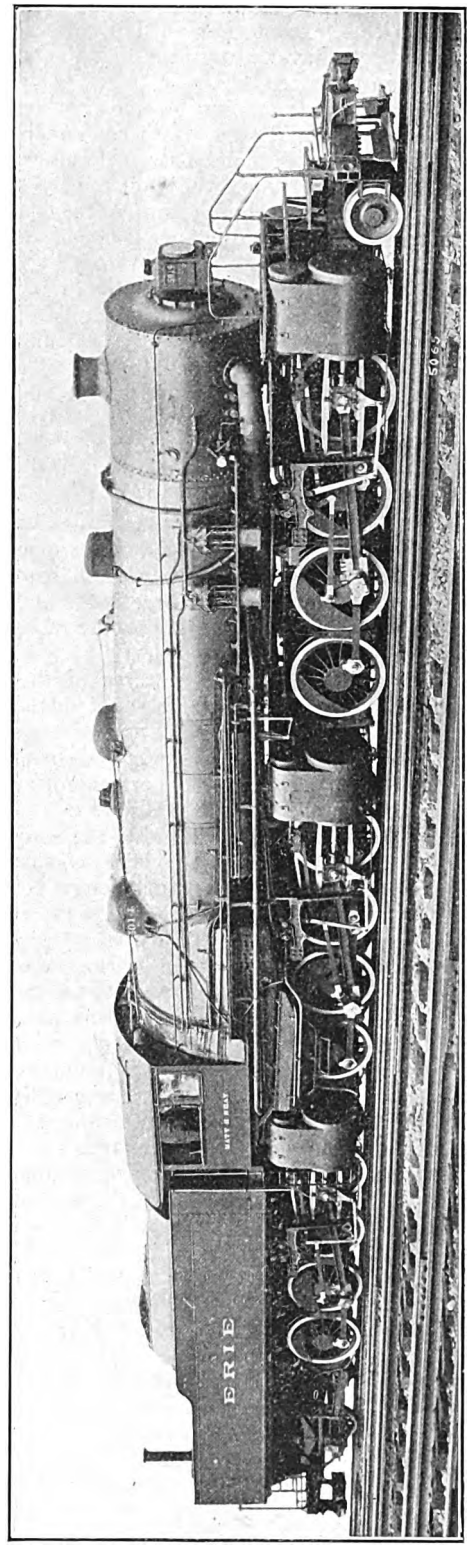
Digitized by Google

A Schmidt superheater is applied composed of 36 elements; and the steam distribution is controlled by 15-in. piston valves driven by Walschaert motion. Reversing is effected by the Ragonnet power reversing-gear. This device is operated by compressed air, and is being extensively used on heavy locomotives. The cut-off can be adjusted to the most economical point while the engine is running, without labour on the part of the engineman; and the lever in the cab occupies very little room, which adds to the comfort of the engine crew and facilitates a more convenient arrangement of the other cab fittings.

The trailer truck is of the Hodges type, which has been applied by the builders to a large number of locomotives. A half-elliptic spring is mounted over each truck box, and the spring hangers are jointed to compensate for the side swing of the truck when the locomotive is traversing curves. The truck springs and driving springs are connected by equalizing beams, as is usual in American practice.

A development of the 2–8–2 type is found in the 2–10–2, which is now being used for heavy freight service on a number of roads. The locomotives for the Chicago, Burlington and Quincy Railroad and the Baltimore and Ohio Railroad represent this type. Their similarity to the "Mikado" type is marked, as the boilers have wide and deep fireboxes placed back of the driving-wheels and over the trailing trucks. This provides high steaming capacity in proportion to the adhesion; the engines being so proportioned that they are suitable for long runs in road service.

Special provision has been made in these locomotives, to enable them to traverse curves of short radius. The third, or main pair of coupled-wheels, have plain tires without flanges, and the lateral play between the rails and wheel flanges is greater in the first and fifth pairs of wheels than in the second and fourth pairs. On the locomotives for the Burlington road, the first and fifth pairs are allowed a greater amount of side play in the driving-boxes than the others. In order to compensate for this, the knuckle pins in the side-rod stubs on the second and fourth pairs of driving-wheels are fitted into spherical bushings of hardened steel, so that the rods are allowed a limited amount of side play. The front and rear trucks are of the radial swing type. With this construction, these large locomotives can traverse curves of 350 ft. radius. The general arrangement



2-8-8-8-2 "TRIPLEX" ARTICULATED LOCOMOTIVE: ERIE RAILROAD.

Digitized by Google

on the Baltimore and Ohio locomotive is similar to this, except that all five pairs of driving-wheels have a uniform amount of side play in their boxes.

The boilers of these two locomotives are generally similar in design. Both have deep, wide fireboxes with combustion chambers extending forward into the boiler barrel. This construction provides ample furnace volume, and reduces the distance between the front and back tube sheets, thus keeping the length of the tubes within reasonable limits. A brick arch is applied, so that a long flame way is provided, and the end of the boiler tubes are well protected against sudden changes in temperature. Both boilers are fitted with Schmidt superheaters and fired with the Street mechanical stoker. This device conveys coal from the tender to three distributing points in the rear of the firebox. From here the coal is blown on the grates by means of steam jets. The mechanical stoker is partly responsible for the success of these large units, as it would be practically impossible to work them at full capacity when firing by hand.

Counterbalancing of locomotives of this size presents some unusual problems, owing to the weight of the reciprocating and revolving parts and the comparatively small size of the driving-wheels. The locomotive for the Baltimore and Ohio Railroad is provided with counterweights keyed to the main driving axle, in addition to the usual weights in the wheel centres. This arrangement is not necessary on the Burlington locomotive, as here the reciprocating and revolving parts have been materially lightened by the use of special materials. The piston-rods, main and side rods, stub-straps and main crank-pins, are of nickel-chrome steel, annealed; while the pistons and cross-heads are annealed castings of ·40 carbon steel, with unusually light sections. This has effected a saving of 16 per cent. in the weight of the reciprocating parts on each side of the locomotive, as compared with similar engines on the Burlington road on which alloy steel is not used for these parts.

The high tractive forces of these locomotives (71,500 lbs. for the Burlington engine and 84,500 lbs. for the Baltimore and Ohio), place them in the front rank of non-articulated locomotives as far as hauling capacity is concerned. It is significant that, in actual service, they are proving thoroughly efficient and economical; and a more extended use of the type may be expected in the future.

The Mallet articulated locomotive for the Norfolk and Western Railway is one of forty recently constructed for this line. The use of this type is chiefly confined to pushing and freight service on divisions having heavy grades. The Norfolk and Western Railway handles a large coal traffic over difficult profiles, and conditions are favourable to the use of Mallet locomotives. The new engines, which are designed and equipped for road service, have the 2–6–6–2 wheel arrangement, and develop a tractive force of 73,000 lbs. working compound. This can be materially increased if desired, by using high-pressure steam in the low-pressure cylinders; a by-pass being provided so that the high-pressure cylinders exhaust directly into the atmosphere when working under such circumstances.

In this design the boiler is of unusual length, as the firebox is placed back of the rear driving-wheels, and the boiler barrel extends partly over the front group of driving-wheels. The firebox has a combustion chamber 78 in. long, extending forward into the boiler barrel; and the tubes are 24 ft. long. The firebox contains a brick arch supported on water-tubes, and the firing is done mechanically, Street stokers being applied to 25 locomotives and Hanna stokers to 15.

The superheater is of the Schmidt type, arranged with 36 elements. The high pressure steam pipes pass out through the smoke-box walls, and extend back to the high-pressure cylinders. Here the distribution is controlled by inside admission piston valves, 12 in. in diameter. The low-pressure cylinders are fitted with double-ported slide valves, which give satisfactory service; as the temperature of the steam at this point is not sufficiently high to cause inconvenience or excessive wear in their operation.

Baker valve gear is used on these locomotives. This is a radial gear, pin-connected throughout, no links or sliding blocks being used in its construction. The motions of the front and back engines are controlled simultaneously by the Ragonnet power reverse mechanism.

"Triplex" articulated locomotive No. 5014, for the Erie Railroad, has already been described in the pages of the RAILWAY MAGAZINE; but it is included here in order to complete the present series. This locomotive is now in service, and is proving successful. On a test run, made to determine its hauling capacity, it drew a train composed of 250 loaded cars, weighing 17,912 tons (of 2,000 lbs.) a distance of 23 miles. The track was

Digitized by Google

approximately level, the maximum grade against the train being about 1 in 1,100. Pushers were used at the start, in order to prevent pulling out couplings; but when the train was under way, the entire work was done by the "Triplex" locomotive.

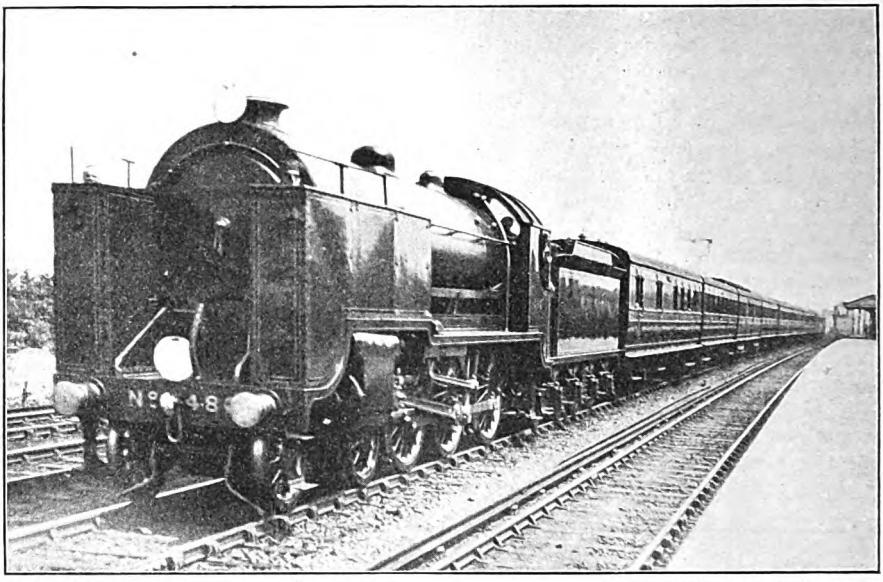
It is, of course, evident that the value of a locomotive of this size lies not so much in its ability to haul trains of such unusual weight, as in its capacity for pushing service on steep grades. Where locomotives are loaded to their maximum rating over the greater part of a division, a comparatively short but steep grade on the line may necessitate the use of several pushers in order to take the train through unbroken. Here the triplex locomotive, with the hauling capacity of three ordinary engines, can assist the road engines in taking the entire train over the grade. Speed is not a matter of special importance in this kind of service, and the boiler of the triplex is of sufficient capacity to maintain full pressure while working the engine at slow speeds and long cut-offs.

One of the notable features of this large locomotive is that, while its general design is new, the majority of the details entering into its construction have been fully tried out in other types of locomotives. This is particularly true of the machinery and running gear, the flexible steam pipes, articulated frame joints, and boiler. As far as practicable, parts subject to wear have been made interchangeable with corresponding details of the "Mikado" type locomotives in service on the Erie. This will materially lessen the expense of maintaining the "Triplex" locomotive.

The following table contains the principal dimensions of the locomotives described in this article.

Road	M. & P.	I.C. R.R.	C.B.&Q.	B. & O.	N. & W.	Erie.
Type	2–8–0	2–8–2	2–10–2	2–10–2	2–6–6–2	2–8–8–8–2
Cylinders, diam. x stroke ..	22″ × 28″	27″ × 30″	30″ × 32″	30″ × ″32	2 H.P. 22″ × 32″ 2 L.P. 35″ × 32″	2 H.P. 36″ × 32″ 4 L.P. 36″ × 32″
Boiler, diameter	76″	82″	88½″	90″	83⅞″	94″
Steam pressure, lbs.	190	175	175	200	200	210
Firebox, length	108⅛″	120⅝″	132″	132″	108⅛″	162″
Firebox, width	66¼″	84″	96″	96″	96⅛″	108″
Tubes, diameter	5⅜″ & 2″	5⅜″ & 2″	5½″ & 2¼″	5½″ & 2¼″	5½″ & 2¼″	5½″ & 2¼″
Tubes, number	5⅜″, 32 2″, 226	5⅜″, 36 2″, 262	5½″, 45 2¼″, 264	5½″, 48 2¼″, 269	5½″, 36 2¼″, 224	5½″, 53 2¼″, 326
Tubes, length	13′ 10″	20′ 6″	22′ 7½″	23′ 0″	24′ 0″	24′ 0″
Grate area, square feet	49·5	70·4	88	88	72	90
Water heating surface, square ft.	2,453	4,106	5,349	5,573	4,771	6,886
Superheating surface, square ft. ..	511	887	1,232	1,329	1,022	1,584
Wheelbase, driving	14′ 3″	16′ 6″	20′ 9″	21′ 0″	30′ 6″	71′ 6″
Wheelbase, total engine	23′ 4″	35′ 2″	40′ 1″	40′ 3″	48′ 10″	90′ 0″
Wheelbase, total engine and tender	55′ 2½″	65′ 6¼″	74′ 9½″	76′ 6″	78′ 4½″	—
Weight on driving-wheels, lbs. ..	170,300	218,300	293,000	336,800	341,000	761,600
Weight, total engine, lbs. ..	193,850	282,700	370,000	406,000	411,700	853,050
Weight, total engine and tender, lbs.	310,000	455,000	555,000	584,000	571,000	—
Tank capacity, U.S. gallons ..	6,000	9,000	10,000	10,000	9,000	10,600
Fuel capacity, tons (2,000 lbs.) ..	10	15	15	16	14	16

Digitized by Google



Photo] [*W. H. C. Kelland.*

LONDON AND SOUTH WESTERN RAILWAY.

11.10 a.m. West of England express drawn by one of Mr. Urie's new 4–6–0 locomotives (No. 480, Schmidt superheater series) fitted with indicator shelter.

British Locomotive Practice and Performance.

By CECIL J. ALLEN.

DURING 1914 the most notable railway event—other, of course, than the taking over of the railways by the Government under war conditions—has been the inauguration of the new Great Eastern Railway winter train services on October 5th last. Had it not been for the conditions of war prevailing, so momentous a reorganization of the time-tables of a great railway would doubtless have received the widespread attention that it deserves. For the new Great Eastern Railway time-table is unique in that it embodies, not the usual piecemeal alterations of trains, but the complete reconstruction of the whole fabric on a scientific basis. It does not lie in my province here to deal with the train services as a whole, as that was done last month by another writer; in their speed aspect, however, the new times are of great interest. The new long distance bookings do not, in most instances, represent any advance on the fastest summer times previously in force, but it will be admitted by those who are well acquainted with the Great Eastern road, and its peculiar difficulties of grading and alignment, that the Great Eastern summer schedules with summer loads entailed first class locomotive work. This locomotive effort will now be required throughout the year, and, in addition to long-distance runs at "summer" speed, the times of the slower expresses or "semi-fast" trains have been substantially curtailed, necessitating remarkably smart performance in every direction.

Prior to the present year, the number of start-to-stop bookings at 50 miles per hour or over on the Great Eastern Railway was insignificant, totalling less than half-a-dozen in all. Such trains as the "Norfolk Coast Express," the Yarmouth non-stop expresses, and others, only fell short of this figure by small margins, due entirely to swing-bridge and other difficulties at each end of the run, which lowered the average speed. Intermediate bookings, however, where a higher end-to-end speed was practicable, had not

Digitized by Google

been correspondingly improved, and in this respect the new times are nothing short of revolutionary. I have compiled a list of runs on the Great Eastern Railway now scheduled at 50 miles per hour and over, and this is reproduced on this page.

The remarkable character of this table will at once be apparent. It lies in the fact that only four of the twenty distances shown are over 30 miles in length, while no less than ten are under 20 miles. Lack of space forbids the detailed consideration of every run, but certain special features may be noted. The first run is one of extraordinary brilliance over such a line as the East Suffolk, with its 1 in 70 and 1 in 80 grades. On starting from Halesworth the line falls at 1 in 81 for ½ mile, and the grades generally are favourable, but the undulations are sharp, with adverse grades of 1 in 75, 1 in 80, and 1 in 104 at different points, each a full mile in length. Even with a light load, therefore, any engine will have its work cut out to keep time on this booking. Curiously enough, the public time-tables and the working book, owing to an error since corrected, make a still more startling demand upon locomotive power, as they show the time to be 18 min. —average 72·2 miles per hour start to stop! Moreover this run has a companion in the booking of the 6.28 p.m. express from Yarmouth to London, allowed 20 minutes to cover the 22 miles 32 chains from Saxmundham to Ipswich, start to stop, at an average of 67·2 miles per hour! Had not these two times embodied errors of 5 min. and 10 min. respectively, the Great Eastern Railway might have won "hands down" the title to the "Fastest Train in the British Empire."

No. 2 run is also an exceedingly fine booking. It is made with the second portion of the morning newspaper train from Liverpool Street. Here again there is an undulating line, with a rising start, although not nearly so steep as the East Suffolk grades. No. 3 run is an old booking, the time-table giving 16 min. to the start from Haxey, but as the time allowed thence to Gainsborough is fairly easy, it is doubtful whether every driver would attempt to keep strict time over the initial stretch. No. 4 is a new booking over a dead level line, and is quite a brilliant little "snippet." Runs Nos. 5, 7, 9 and 17 are characteristic of the Southend branch services, which until the present have provided nearly all the fastest runs on the Great Eastern Railway. Many others might be named on this section at speeds of 48 and 49 miles per hour; such runs as Nos. 7 and 9, indeed, are quite the last word in speed over such short distances. No. 8 is, I am afraid, a run of the "counsel of perfection" order, seeing that the major part of the distance

GREAT EASTERN RAILWAY.

RUNS BOOKED AT START-TO-STOP SPEEDS OF 50 M.P.H. AND OVER.

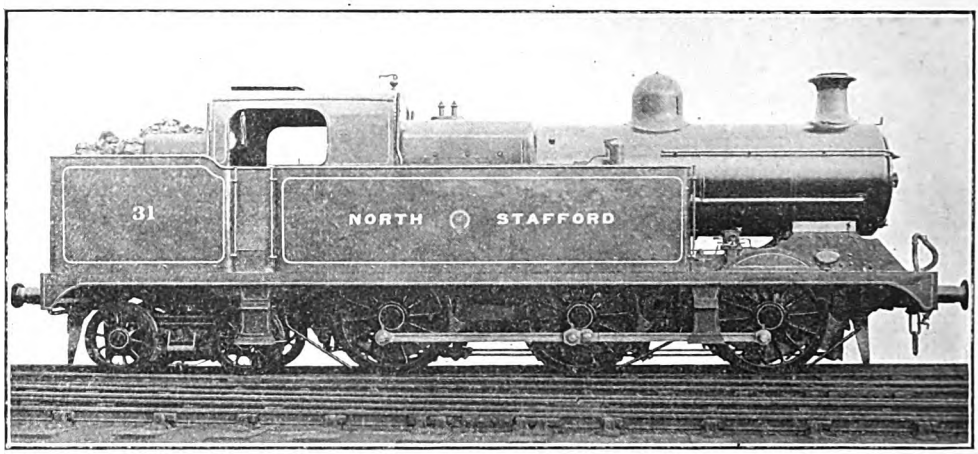
No. of Run.	Stations.	Distance. M. C.	Time. Mins.	Speed. m.p.h.	Trains.
1	Halesworth–Woodbridge	21 54	23	56·6	†8.24 a.m.
2	Chelmsford–Colchester	21 75	24	54·9	5.58 a.m.
3	Doncaster–Haxey	13 20	15	53·0	5.24 p.m.
4	Ely–Downham	15 53	18	52·2	10.40 a.m., 4.41, 7.34 p.m.
5	Shenfield–Prittlewell	20 56	24	51·8	5.56 a.m., ‡8.36, 10.20 p.m.
6	Sleaford–Spalding	18 78	22	51·8	9.35 a.m.
7	Shenfield–Rayleigh	12 75	15	51·8	11.43 p.m.
8	Diss–Haughley	12 6	14	51·8	9.41 a.m.
9	Rayleigh–Prittlewell	7 61	9	51·7	‡5.38, ‡7.56, 11.59 p.m.
10	Norwich–Ipswich	46 22	54	51·4	8.53, 11.33 a.m., 2.14 p.m.
11	Spalding–March	19 53	23	51·3	9.59 a.m., 3.31 p.m.
12	Diss–Ipswich	26 25	31	50·9	7.25 p.m.
13	Diss–Stowmarket	14 31	17	50·8	†8.33 a.m., 4.13 p.m.
14	Chelmsford–Mark's Tey	16 71	20	50·7	10.48 a.m., 12.32, 6.26 p.m.
15	Chelmsford–Colchester	21 75	26	50·6	5.47 a.m., 4.6, 7.2, 9.27 p.m.
16	Colchester–Chelmsford	21 75	26	50·6	5.19 p.m.
17	Shenfield–Rochford	18 40	22	50·5	12.45, *1.50, ‡3.48 p.m.
18	Liverpool Street–Parkeston ..	68 72	82	50·4	8.30, 8.40 p.m.
19	Colchester–Liverpool Street ..	51 55	62	50·0	8.54, †9.38 a.m., 3.38, †4.6 p.m.
20	Cambridge–Spalding	50 0	60	50·0	12.34 p.m.

† Mondays only. * Saturdays only. ‡ Saturdays excepted.
Total number of runs:—Mondays, 40; Tuesdays-Fridays, 36; Saturdays, 33.

Digitized by Google

is uphill, and even No. 13, with the benefit of Haughley bank, will want doing. One of the "gems" of the new tables is the 54-min. booking from Norwich to Ipswich—No. 10 on the list. With average loads of 6 to 8 bogie vehicles, this is a timing well within the capacity of the engines, even though the grades are decidedly difficult in parts, especially from the start. Runs Nos. 6 and 11 have been in existence for some time, and are generally representative of work on the Great Northern and Great Eastern Joint Line, which is always of a smart character. No. 12 is a run with a rising start, but is easy as compared with Nos. 8 and 13, seeing that the grades are entirely favourable from the summit of Haughley bank into Ipswich.

Runs 14 to 16, which from their number will be seen to have a "standard" character, are inclined to be tightly timed, when loads are at all heavy, and in any case require smart work. This is the best graded section of the Great Eastern Colchester main line, but the starts from both Chelmsford and Colchester rise sharply for a short distance, more especially in the case of the latter town. Chelmsford to Colchester in 26 min. is an easier booking than Colchester to Chelmsford in the same time, which accounts for the more general allowance of 27 min. in the latter instance. Colchester will also be reached more easily in 26 min. from Chelmsford than Mark's Tey in 20 min. from the same point, the distance being longer, and the concluding stage on a falling grade. No. 18, with average loads, is the hardest all-the-year-round booking on the Great Eastern Railway. It is necessary to cover the 59½ miles to Manningtree in 70 min., and this is no light task over Great Eastern Railway grades with a heavy boat express. These



NEW 0–6–4 SUPERHEATER ("ROBINSON" DESIGN) TANK LOCOMOTIVE: NORTH STAFFORDSHIRE RAILWAY.
Designed by Mr. J. H. Adams, Locomotive Superintendent.

In the November, 1913, RAILWAY MAGAZINE we gave a line diagram showing a new 0–6–4 tank engine design that Mr. J. H. Adams was introducing on the North Staffordshire Railway. The first of these is now completed, and by the courtesy of Mr. Adams we are able to give a photograph and the leading particulars. These engines are fitted with "Robinson" superheaters, also feed water heaters of the North Staffordshire Railway type, and although comparative tests have not yet been made, it is expected that considerable economies in fuel and water will be effected. These locomotives have been built chiefly for goods and mineral traffic, but they will, as occasion demands, take a turn on heavy passenger trains. A steam brake is fitted to all wheels of the engines, and a combination ejector is provided to work this in conjunction with the vacuum brake on the trains. A duplex steam pump, made by the North Staffordshire Railway, is fitted to supply hot feed-water into the boiler.

Cylinders	20 in. by 26 in	Heating surface—	
Wheels (coupled)	5 ft. diam.	Firebox	129 sq. ft.
Working pressure	160 lb. sq. in.	Tubes (flue)	887 ,,
Tank capacity	2,250 gallons.	,, (superheater)	258 ,,
Bunker capacity	3½ tons coal.		1,274 sq. ft.
Weight (loaded) on coupled wheels	52 tons.	Grate area	21 ,,

Total weight in working order, 72 tons.

Digitized by Google

trains are, of course, suspended for the present. No. 19 is the new standard booking from Colchester to London, and leaves no time to spare, the start being adverse and the conclusion of the run over congested lines much subject to delay. The corresponding time from Ipswich is 84 min., and from Chelmsford 37 min., in both cases just below the 50 miles per hour average. In the reverse direction 65 min. is the time allowed to Colchester, in view of the heavy rise from London to Shenfield, and 84 min. to Ipswich, the 17 miles between Colchester and Ipswich being more favourable to down than to up trains. No. 20 is also a brand new schedule, Ely and March being both missed, although a severe slack is imperative in the latter instance; beyond this the road is dead level, and the time should be observed without difficulty. I must not be tempted to go further into these important and far-reaching changes; enough has been said, however, to show that an entirely new era of speed has opened on the Great Eastern Railway.

I have enjoyed one or two runs on the new Great Eastern services, and, although the working was still in the transition stage, the runs timed gave good promise for the future. The principal trouble at first seemed that of conforming to the much reduced times allowed at stations. On the Colchester line my first trip was made on the 8.30 a.m. express *ex*-Liverpool Street, which, with portions for Cromer, Yarmouth and Lowestoft, and restaurant cars, loads heavily. This was the first Saturday of the new service, and the train was composed of twelve 8-wheeled corridor coaches and one 4-wheeled van, total 50 axles, or 345 tons with passengers and luggage. The engine was No. 1527, of the 4–6–0 superheater type, which worked through to Norwich. A rather sluggish start was made, Stratford, 4 miles out, being passed in 9 min. 25 sec.; Chadwell Heath, 10 miles, in 16 min. 55 sec.; Ingrave summit, 19¼ miles, in 29 min. 25 sec., and Shenfield, 20⅛ miles in 30 min. 50 sec. Our minimum speed on the 1 in 84 of Brentwood bank was 28·5 miles per hour, and we passed Shenfield nearly 2 min. behind time.

Thenceforward time was steadily regained. The 9⅝ miles from Shenfield to Chelmsford took 9½ min.; the 8⅞ miles Chelmsford to Witham (where we were only ½ min. late) 9 min. 20 sec.; and the 8 miles Witham to Mark's Tey 8 min. 40 sec.—total, 26½ miles in 27½ min., and 46⅝ miles from Liverpool Street in 58 min. 20 sec. Unfortunately a bad permanent way check at Lexden prevented us from arriving at Colchester in 64 min., as we certainly should have done; our gross time for the 51¾ miles was 65¾ min., against 65 min. booked. No higher speed was touched than 64·3 miles per hour, between Ingatestone and Chelmsford. Although the distance between Colchester and Ipswich is only 17 miles, 22 min. is a "tight" allowance for heavy trains, owing to the severe grades, and our time was 23 min., ½ min. of which, however, could be attributed to a signal check outside Ipswich. Time probably could have been kept by means of a higher speed at Manningtree, where the maximum was only 64·3 miles per hour, but on the other hand the minimum of exactly 45 at Belstead summit, after a mile up at 1 in 145 and two at 1 in 157, was particularly good.

At Ipswich we dropped the Yarmouth and Lowestoft portions, thus reducing the load to the serviceable figure of seven 8-wheelers, including restaurant cars, or 200 tons in all. The start was noteworthy, Bramford, 2½ miles, being passed in 4 min. 20 sec., while Stowmarket, where a special stop is made on Saturdays, was reached in 14½ min. As the distance is only 6 chains short of 12 miles, and the grades are slightly against the engine, this was very smart work. Our start from Stowmarket was the finest effort of the journey; up the 1 in 148 and 131 of Haughley bank we actually accelerated to 45·5 miles per hour, passing Haughley, 2¼ miles, in 4 min. 10 sec., and Finningham, 5⅞ miles, in 8 min. 40 sec. On the descent to Diss the pace was disappointing, not exceeding 66·2 miles per hour; the 8⅜ miles from Finningham to Diss took 8 min. 10 sec.; the 5½ miles from Diss up to Tivetshall 6 min. 5 sec.; and the 12⅜ miles from Tivetshall to Trowse Upper Junction, including the troublesome slack over the temporary bridge at Flordon, 13¼ min. We had covered the 32⅛ miles from Stowmarket to this point in 36 min. 10 sec., and the 44⅛ miles from Ipswich, inclusive of Stowmarket stop, in 51 min. 20 sec. With only 2⅛ miles further to run, we should therefore have finished without difficulty in the 56 min. allotted, despite the extra stop, but two severe signal checks outside Trowse made our total time 57 min. 35 sec. for the 46¼ miles.

On the return journey we did magnificently throughout, the engine being No. 1521, also of the 4–6–0 type, ably handled by Cupper, of Norwich. The load in this case was one of six 8-wheeled corridor coaches, well filled, weighing in all 170 tons. An excellent start

Digitized by Google

was made, a speed of 30 miles per hour being maintained up the 1 in 84 to Trowse Upper Junction, which was passed in 4 min. 55 sec. Speed now rose rapidly, and kept at 51·7 miles per hour up the 1 in 143 to Flordon summit, but the descent of the short ensuing bank was spoiled by the temporary bridge slack. On the final ascent of 1 in 139 and 174 to Tivetshall "tableland," the minimum speed was 50·6 miles per hour, and the 12⅜ miles from Trowse Upper Junction to this point had only taken 14 min. 20 sec. The gross time of 19¼ min. from Norwich thus showed a gain of ¾ min. on booked time. Descending to Diss we reached a maximum of 69·2 miles per hour, and on the long and broken rise to Finningham, including 1¾ miles at 1 in 132 and 2 miles at 1 in 248, no lower speed than 57·7 miles per hour was recorded. So the time from Tivetshall to Diss, 5½ miles, was 5 min. 10 sec.; from Diss to Finningham, 8⅜ miles, 8 min. 25 sec.; and from Finningham to Haughley, 3⅝ miles, 3½ min.; 2 min. 40 sec. had now been gained on the booking of 39 min. for the 32 miles from Norwich. Down Haughley bank the maximum speed was 76·3 miles per hour, the 2 miles 25 chains from Haughley to Stowmarket taking 1 min. 55 sec.; thenceforward speed was eased somewhat, the 9⅝ miles on to Bramford taking 9 min. Had it not been for a severe signal check outside Ipswich, we should have completed the 45¼ miles' journey from Norwich in 50 min.—4 min. under schedule time—but our actual time was 50 min. 50 sec. The 29⅜ miles from Tivetshall to Bramford were covered in 28 min. exactly.

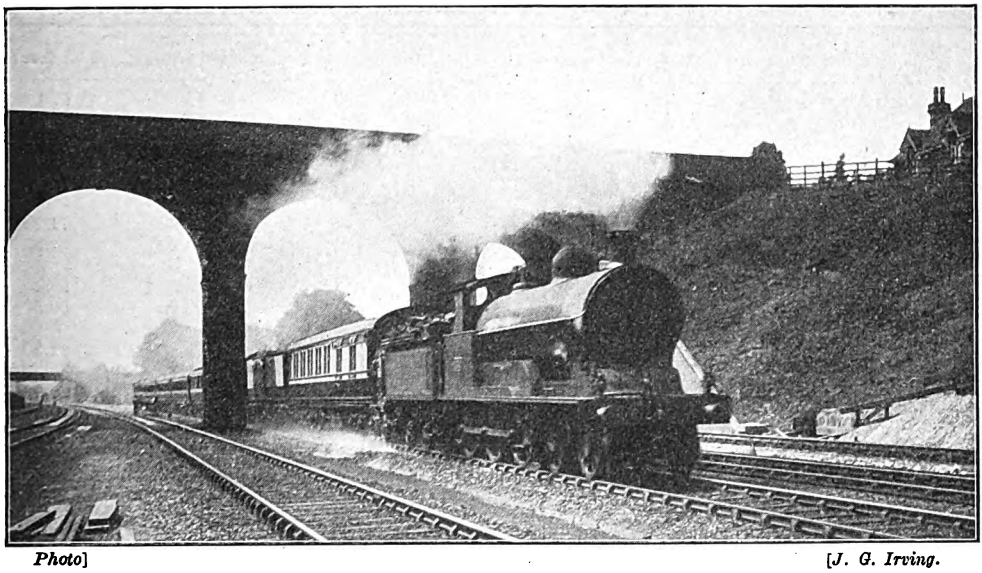
At Ipswich our load was increased by four corridor 8-wheelers and a 6-wheeler, now totalling 43 axles, or 300 tons with passengers and luggage, and Cupper set out in grand style to retrieve the arrears of time. On the ascent of 1 in 120 and 130 to Belstead Box a speed of 35·3 miles per hour was attained, this first 3¾ miles being covered in 7 min. 35 sec. The descent to the Stour Valley was responsible for a maximum speed of 68·1 miles per hour, and Manningtree was passed in 13 min. 40 sec. Despite the second sharp rise of 2½ miles at 1 in 134 beyond Manningtree, Colchester, 17 miles, was passed in 22 min. 20 sec. A minimum speed of 44·5 miles per hour was registered on the rising grades south of Colchester, culminating in 1½ miles at 1 in 163 and 128; on the easy stretch from Mark's Tey to Witham the speed was maintained generally at from 61·6 to 64·3 miles per hour. So the 13⅛ miles from Colchester to Witham occupied only 13 min. 55 sec., while a continuance of this fine work took us through Chelmsford, a further 8⅞ miles, in 9 min. 25 sec. more. From Chelmsford to Shenfield the rising grades were tackled finely; at Ingatestone we were still doing 50 miles per hour, and at Shenfield 47·4, while the lowest speed on the 2¼ miles of 1 in 110 to 135 culminating at Ingrave Summit was 44·1 miles per hour. The distance of 9⅝ miles from Chelmsford to Shenfield was covered in exactly 11 min. In the descent of Brentwood Bank a maximum speed of 76·3 miles per hour was touched, and a high speed was maintained on the level grades beyond, not falling below 72·5 miles per hour at Romford and 70·3 at Chadwell Heath. So the 10¼ miles from Shenfield to Chadwell Heath were covered in 9 min. 25 sec., the 8 miles 17 chains from Brentwood only occupying 6 min. 55 sec.

Unfortunately a dead stop for signals now succeeded, the train coming to a stand at Ilford station 69 min. 5 sec. after leaving Ipswich. As Ilford is 61 miles 27 chains from Ipswich, the average speed of this remarkable run works out at 53·3 miles per hour, start-to-stop. Of this distance the 53 miles 16 chains from Bentley to Chadwell Heath were covered in 55 min. 55 sec., at an average of 57·1 miles per hour, and 3 min. had been gained on schedule time up to the last-mentioned point. On starting from Ilford, after a stop of 45 sec. duration, we ran without further check to Bishopsgate, where we were stopped again, this brief 7 miles' journey taking 12 min. 40 sec. Finally we arrived at Liverpool Street in exactly 85 min. from Ipswich, 1 min. over booked time, after 2 dead stops costing at least 6 min. Despite the Ilford stop, we should just have arrived in schedule time but for the second stop at Bishopsgate; allowing for both delays the net time was 79¼ min. for the 68¾ miles run, start-to-stop. It is worthy of note that the gross time from Norwich to London was ¼ min. less than that booked, inclusive of the delay outside Ipswich, 2 min. overtime spent at that station, and the signal stops at Ilford and Bishopsgate, so that the net gain of 10 min. on these new times between Norwich and London reflects the greatest credit on Driver Cupper and his locomotive.

The reconstructed Cambridge line time-table is a little disappointing, as I am convinced that the fastest time of 70 min. between London and Cambridge by no means represents the limit of the tractive powers of modern Great Eastern locomotive stock. It

Digitized by Google

is curious that, as on the London and South Western Railway and other lines, Great Eastern locomotive running is seen at its best on the hilly sections of the line, rather than on those portions having the long unbroken stretches of more moderate inclination. I tried the 3 p.m. express from Liverpool Street on the first Saturday afternoon of the new service, the engine being again a 4–6–0—No. 1509—and the load eight corridor 8-wheelers and two 6-wheelers, weighing in all 250 tons. Hackney Downs, 3 miles out, was passed in 7 min. 50 sec., but we were almost stopped by signal between there and Clapton, and so took 14 min. 10 sec. to clear Tottenham, 6 miles. There now followed a characteristically sluggish run to Broxbourne, per hour, and covered the 5¼ miles from Bishop's Stortford (passed at reduced speed) to Elsenham in 6 min. 40 sec. Gathering speed rapidly, we passed Newport at 69·2 miles per hour, fell to exactly 60 on the short 1 in 137 rise to Audley End, and then maintained 67 miles per hour for some distance past Great Chesterford. So the 6⅛ miles from Elsenham to Audley End took 6 min. 10 sec. and the 10¾ miles thence to Shelford 10 min. 5 sec., while we finally came to a stop opposite the south end of Cambridge platform 4 min. 5 sec. later, in 70 min. 35 sec. from Liverpool Street. With a clear road we should have stopped at the north end in 71 min. easily, or 68 min. net, allowing for the checks at Clapton and Spelbrook. The feature of the



Photo] [*J. G. Irving.*

LONDON AND NORTH WESTERN RAILWAY.

10 a.m. West Coast Express (Edinburgh portion) at Bushey. 4–6–0 locomotive No. 1676 *Shakespeare.*

the 11 miles of all but level line taking 13 min. 35 sec., with speed at no point exceeding 50 miles per hour. On the steepening grades to Bishop's Stortford, mostly from 1 in 300 to 350, the speed increased—to an average of about 54 miles per hour—the work here being as good as that previously had been indifferent. A bad signal check at Spelbrook Box, however, made the time for the 13⅜ miles from Broxbourne to Bishop's Stortford 15 min. 50 sec.

We were now 3½ min. behind time, but the very best work was reserved for the concluding stage. No. 1509 breasted Stansted bank, culminating in 1¼ miles at 1 in 132 and 107, at a minimum speed of 44·2 miles run, of course, was the time of 27 min. for the 25¼ miles from Bishop's Stortford to Cambridge, against 31 min. booked; coupling this with the sluggish work south of Broxbourne we have ample evidence that in the matter of Cambridge line times the Great Eastern Railway has by no means yet "shot its bolt."

A return journey on the 4.42 p.m. non-stop express from Cambridge calls for little comment, 73 min. proving an easy booking for the 55¾ miles' journey. The engine was No. 1823, a 4–4–0 of the Belpaire "Claud Hamilton" class, fitted with "top-feed" apparatus, and the load six 6-wheelers and four 8-wheelers, or 210 tons. Again the best

Digitized by Google

running was made on the more hilly section, the initial 14 miles to Audley End—entirely adverse—being covered in 19 min. 10 sec., and the further 6⅛ miles to Elsenham summit in 7 min. 25 sec. On the steepest part of the ascent to Audley End—2½ miles at 1 in 149 to 163—the lowest speed was 40·7 miles per hour, and on the 2¾ miles at 1 in 254 and 176 to Elsenham nothing lower than 44·5 was touched. So Bishop's Stortford was passed in the excellent time of 32 min. from Cambridge, speed being carefully reduced as usual. After this the running was decidedly mediocre. A signal check at Harlow caused the 13⅜ miles from Bishop's Stortford to Broxbourne to take 16 min. 25 sec., and after that the most tempting stretch of very mention a particularly good run behind one of the Borsig engines on the South Eastern and Chatham Railway, for details of which I am indebted to an Ealing correspondent. The engine in question was No. 779, and the train the 3.53 p.m. from Cannon Street to Hastings, consisting of four American cars, three ordinary 8-wheelers and a 6-wheeled van—about 220 tons in all. Starting 6 min. late, the express was brought to a momentary stand for signals outside London Bridge, and did not pass New Cross until after 4.6 p.m., but thenceforward good work was done. The 4 miles from New Cross up to Grove Park, partly at 1 in 140, occupied 5 min., and the 4¾ miles thence to Orpington, including 2 miles at 1 in 120, 6 min. 55 sec. Unfortun-

LONDON AND SOUTH WESTERN RAILWAY, LONDON-SOUTHAMPTON.

Miles.	Train.	12.30 p.m. down		Miles.	6.2 p.m. up		*11.8 a.m. up	§3.23 p.m. up
	Engine No.	467	468		467	468	466	470
	Load (tons)	310	325		220	240	220	275
–	Waterloo	0.00	0.00	79¼	—	—	85.35	—
1¼	Vauxhall	—	—	78	91.10†	95.10†‡ *c*	82.15	75.25†
4	Clapham Junction ..	7.45	7.40	75¼	87.50	87.45	78.20	71.25
12	Surbiton	17.55	18.15	67¼	78.15	78.10 *b*	70.20	62.35
19⅛	Weybridge	25.45	26.25	60⅛	71.05	69.25	63.55	55.40
24⅜	Woking	31.50	32.35	54⅝	66.20	64.25 *a*	59.35	50.50
33¼	Farnborough	44.30	45.30	46	57.25	54.05	51.35	42.20
40	Winchfield	52.05	53.20	39¼	50.35	47.45	45.35	35.35
47⅞	Basingstoke	61.20	63.00	31⅝	42.55	40.40	38.15	28.05
58½	Micheldever	76.00	77.35	21⅛	31.00	29.35	26.55	15.50
66⅝	Winchester	83.45	85.10	12⅝	18.40	18.45	16.15	0.00
73⅜	Eastleigh	89.45	90.55	5⅝	9.25	9.45	8.00	—
79¼	Southampton	98.35	98.35	–	0.00	0.00	0.00¶	—
	Booked time (mins.) ..	102	102	–	90	90	86‖	76

a, Signals, Brookwood; *b*, signals, Hampton Court Junction; *c*, signal stop outside Vauxhall.
¶ Passing time. † Arrival time. ‡ 87½ min. net. * *Ex*-Bournemouth. § *Ex*-Winchester. ‖ To Waterloo.

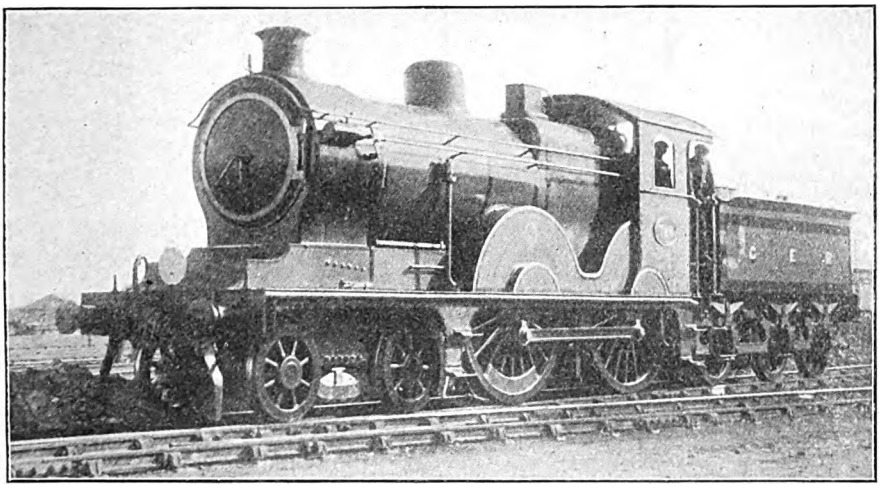
gradually falling line could not encourage the driver to any higher sustained speed than 56·3 miles per hour. Thus it took 11 min. 55 sec. to run from Broxbourne to Tottenham, and terminal delays caused the last 6 miles into Liverpool Street to take 13½ min. The total time from Cambridge was 73 min. 50 sec., but the net time about 71 min. With a late start from Cambridge one might have expected the driver to be a little more enterprising south of Bishop's Stortford.

Another matter of topical interest must now be mentioned. I am not at all anxious to advertise German wares, but as it is not to be supposed that we shall be buying any further locomotives from that country for a little time to come, I think it is safe to ately my friend neglected to take the time at Knockholt, so details of the whole climb cannot be given. The 8¼ miles from Orpington to Sevenoaks were covered in 9¾ min., and the 7½ miles from that town down to Tonbridge 7 min. 5 sec., making a total of 28¾ min. for the 24½ miles from New Cross. Tonbridge Junction, as usual, was taken at reduced speed, and Tunbridge Wells was reached in 44 min. 5 sec. (43 min. net) from Cannon Street, the booking for this 34¼ miles being 48 min. The work on the next stage was even more striking, as it is undoubtedly one of the most difficult stretches of main line in the country. A time of only 18 min. 20 sec. was taken for the 15¼ miles from Tunbridge Wells start to Robertsbridge

Digitized by Google

and the concluding length of 11¼ miles thence to West St. Leonards was completed in 14 min. 25 sec., total 32¾ min. for the 26½ miles, as against 36 min. booked. Thus the engine had 8¼ min. to its credit at the conclusion of the journey, and the arrival was effected on time.

While speaking of South Eastern and Chatham Railway matters I am reminded of a good run on the "Cliftonville" express, with details of which a Bromley friend favoured me a short time ago. The engine was No. 504, a Belpaire 4–4–0, and the load eight bogie vehicles, totalling, with passengers and luggage, 240 tons behind the tender. As those who are familiar with the Chatham section of the South Eastern and Chatham Railway will realize, the working of even so moderate a load as this from Margate to Victoria in 91 min. is no easy task, but schedule time was maintained on this run. Birchington, 3¼ miles from Margate, was passed in 5 min. 58 sec., and Herne Bay, 11¼ miles, in 14 min. 49 sec., after which the ensuing 10¾ miles to Faversham, where speed was reduced as usual, occupied only 10 min. 58 sec. To pass Faversham thus in 25 min. 47 sec. from Margate was an excellent start, as the total distance, although fairly level, is 22 miles. From Faversham the line falls to Teynham and thence rises fairly steeply at 1 in 220 and 110 to Sittingbourne; this stretch of 7¼ miles occupied 8 min. 52 sec., and the easily graded length of 10½ miles on to Chatham was covered in 11 min. 11 sec. A distance of 39¾ miles had now been covered in 45 min. 50 sec., but the more difficult work lay ahead. The tortuous 1¼ miles from Chatham to Rochester Bridge consumed 1 min. 41 sec., and the ensuing 6¼ miles to Sole Street, including the well-known Sole Street bank of 5 miles at 1 in 100, a further 10 min. 43 sec. Speed rapidly recovered on the 6¼ miles of favourable grades to Farningham Road, which occupied 6 min. 50 sec., and the subsequent ascent of 2¾ miles to Swanley occupied 2 min. 56 sec. The undulating 7 miles from Swanley to Bromley were covered in 7 min. 10 sec., and the 6¾ miles thence to Herne Hill 8 min. 20 sec. A time of 18 min. 35 sec. for the 18¼ miles from Meopham to Kent House was, I should imagine, unusually fast. Between Battersea Park and Victoria a dead stand for signals was encountered, otherwise the 74 miles from Margate would have been covered in 90 min.; as it was, the total time was 91 min. 13 sec., a bare ¼ min. over schedule.



Photo] [*J. Macartney Robbins.*

GREAT EASTERN RAILWAY.

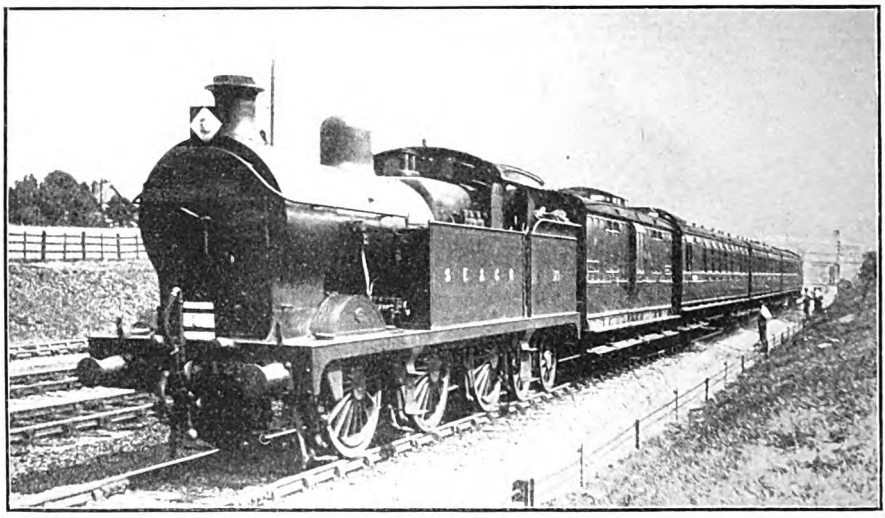
No. 728 (4–4–0 rebuild) equipped with Schmidt superheater.

Before leaving the South Eastern and Chatham Railway, I must mention another quite entertaining little run, in an unexpected locality, sent me by a correspondent at Farnborough. The train was the through Great Western express from Birkenhead to Dover—total weight 150 tons, hauled by a rebuilt Stirling 7 ft. 4–4–0 engine—and the times were taken between Guildford and Redhill. A bad permanent way check to 10 miles per hour occurred just after leaving

Digitized by Google

Guildford, so that it took 4 min. 20 sec. to pass Shalford, 1¾ miles. The uphill work was now surprisingly good. On the long rise of 1 in 96 to 100 which extends from Shalford for some 8 miles, the minimum speeds were 35 miles per hour (a sustained speed) at Chilworth, and 36 miles per hour, beyond Gomshall, the short intermediate favourable mile before Gomshall producing a maximum speed of 53 miles per hour. On the falling grades through Dorking the highest speed was 61 miles per hour, followed by a minimum of 48 on the 1 in 150–170 rise to Betchworth; the mile-a-minute rate was just touched at Reigate, followed by a minimum of 49 miles per hour on the short 1 in 150 ascent beyond. The intermediate times were as follows: Shalford to Gomshall, 5¾ miles, 9 min. 25 sec.; Gomshall to Dorking, 4¾ miles, 5 min. 55 sec.; Dorking to Reigate, 5½ miles, 6 min. 10 sec.; and Reigate to Redhill stop, 1¾ miles, 2 min. 36 sec. The total journey time of 29 min. 9 sec. for the 20¼ miles, or 28 min. net, was quite creditable, the booked time being 32 min., and to cover the 11 miles from Gomshall to Reigate in 12 min. 48 sec. was rapid work on a cross-country route of this hilly character.

I will conclude with a brief description of the remainder of the London and South Western runs promised in the last issue. A City correspondent has furnished me with details of a number of runs on the Southampton line, the best of which are reproduced in tabular form herewith, and these pay a striking tribute to the efficiency in working of the late Mr. D. Drummond's last express design—the large 4–4–0 engines numbered from 463 to 472. All my friend's best runs were obtained with engines of this type, their work in his experience being frequently finer than that of the 6 ft. 7 in. 4–6–0 engines. The first two runs were made on the 12.30 p.m. luncheon car express from Waterloo to Bournemouth with decidedly heavy loads, according to London and South Western standards. Of these the first was decidedly the better, in view of the faster time over the adverse grades out to Basingstoke. But the uphill work was by no means exceptional,



Photo] [*W. H. C. Kelland.*

SOUTH EASTERN AND CHATHAM RAILWAY.

Up fast train drawn by 0–6–4 tank engine (Schmidt superheater) No. 129.
Speed about 60 m.p.h., near Grove Park.

the average speed of 42·1 miles per hour from Woking to Farnborough being hardly a brilliant achievement over a grade averaging mostly about 1 in 310. This train, however, is easily timed, and no higher speed is really necessary, as is evidenced by the fact that, with a most moderate speed on the long descent past Winchester, the arrival at Southampton was 3½ min. early. On the second run the start was still more sluggish, but faster work was accomplished on the final descent, the 15½ miles from Micheldever to Eastleigh only taking 13 min. 20 sec.—average exactly 70 miles per hour—and Southampton was reached with a fast finish in exactly the same time.

Digitized by Google

The up journeys were made on more smartly-timed trains, and showed the tractive power of the engines off to better advantage, although the loads were much lighter. Curiously enough, the engines on the first two runs, with the 6.2 p.m. *ex*-Southampton West, were again Nos. 467 and 468, but in this case No. 468 was responsible for much the better work. This train is timed in a very leisurely manner from the start, so that No. 467, despite an average speed of only 41·4 miles per hour from Winchester up to Micheldever—the central portion of the 16 miles at 1 in 245 to 260 that extends from the 72nd to the 56th mile-post—passed Basingstoke 35 sec. inside schedule time. But the downhill running was so sluggish that the 43⅞ miles from Basingstoke to Clapham Junction actually took 44 min. 55 sec. instead of the 42½ min. booked, and over a minute was thereby lost to Vauxhall. No. 468, however, climbed with a heavier load from Winchester to Micheldever at an average speed of 47·1 miles per hour, gaining 3 min. 5 sec. on schedule time between Eastleigh and Basingstoke. Unfortunately signal delays supervened, the train being badly checked at Brookwood and Hampton Court Junction, and then brought to a dead stand outside Vauxhall for 3 min. The net time of 87½ min. is based upon the times of the preceding run, which was exceptionally slow, but with the faster downhill work of the 2-hours Bournemouth express in the next column, it would have been possible to reach Vauxhall easily in 85 or 86 min. It may be mentioned that the booked passing times of this train from Southampton are: Eastleigh, 9½ min.; Winchester, 19½ min.; Basingstoke, 43½ min.; Woking, 66 min.; and Clapham Junction, 86 min.

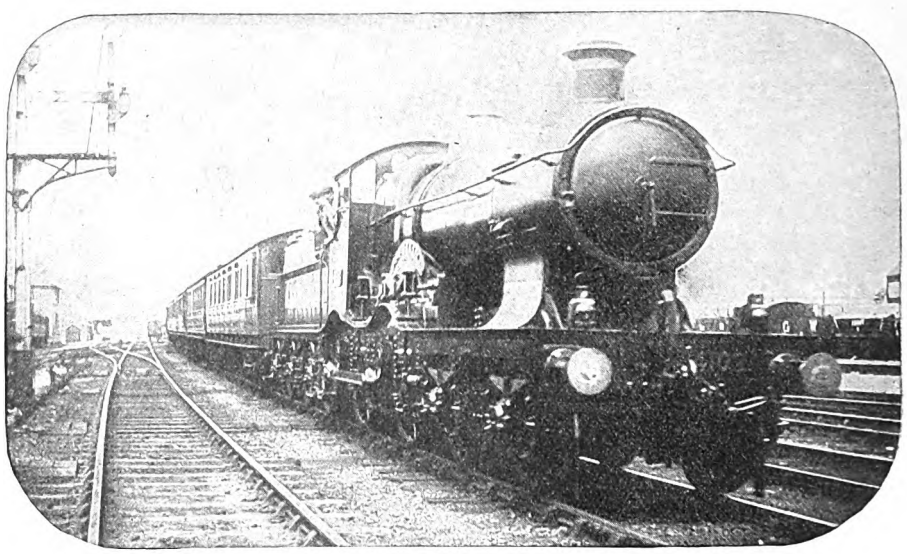
Next run was made on the 9.8 a.m. non-stop express from Bournemouth to Waterloo, which shares with its companion train at 2 p.m. one of the most difficult express schedules in the country. It is usual for drivers on this train to make a very brisk start from Bournemouth, the time thus gained being used to set against the impossibly fast booking of 28 min.—6 min. less than that of the preceding run—for the 25¾ min. from Eastleigh up to Basingstoke. On this run, however, No. 466 took 20 min. 10 sec. to pass Brockenhurst (15⅛ miles), and 34 min. 25 sec. to Southampton West (28¾ miles), so that Eastleigh was only passed 35 sec. in advance of time. But the climbing was a further improvement on even that of the last run, both runs in this respect being among the best I have ever seen recorded. The average speed from Winchester to Micheldever was 47·8 miles per hour, and Basingstoke was passed only 1⅔ min. behind time. Good, though not exceptional, downhill running followed, the best feature of which was the fast time from Woking to Clapham Junction, and an average of all but 66 miles per hour was maintained over the 42⅞ miles from Basingstoke to the latter point. With a slow finish, time to Waterloo was exactly kept. In this case the schedule times from passing Southampton to Waterloo are: Eastleigh, 9 min.; Basingstoke, 37 min.; Woking, 59 min.; and Clapham Junction, 79 min.; from this it will be seen that there is very little time to "play with" at any stage of the run, unduly sharp uphill times being followed by a fast downhill booking from Basingstoke to Clapham Junction. The last run in the table calls for little comment; the load was the heaviest of any on the up journeys, and 35 sec. were gained on the smart booking of 76 min. from Winchester to London. Perhaps the best feature of this trip was the good start to Basingstoke, on a continuously rising grade, with a decidedly heavy load.

In case I should appear to have at all disparaged the 6 ft. 7 in. 4–6–0 engines in previous remarks, I have pleasure in giving publicity to a run behind No. 444 on the 11.10 a.m. summer express from Waterloo to Ilfracombe, for details of which I am indebted to another friend. The feature of this run was the heaviness of the load, which consisted of no less than 13 eight-wheeled vehicles, including restaurant car, the weight of this train of 52 axles, with passengers and luggage, being fully 370 tons. A noteworthy start was made, Clapham Junction being passed in 6 min. 40 sec.; Wimbledon, 7⅜ miles, in 10 min. 46 sec., and Surbiton in 16 min. 5 sec. The next 12⅜ miles to Woking were covered in 13 min. 5 sec., at an average speed of all but 57 miles per hour, the passing time at Woking being 29 min. 10 sec. from the start; Winchfield was passed in 46¾ min., and Basingstoke in 55¼ min. from Waterloo. From Basingstoke the 11⅜ miles to Whitchurch were covered in 12¾ min., and the 7¼ miles thence down to Andover occupied only 6 min. 25 sec.; Andover, 66½ miles from Waterloo, was passed in 74 min. 25 sec. The last 17¼ hilly miles into Salisbury, of which unfortunately my friend sent no notes, other than that the maximum speed descending the Porton bank was 75 miles per hour, occupied only 18 min.

Digitized by Google

25 sec., so that the total time for the journey of 83¾ miles was 92 min. 50 sec. As the booked time for this train is 93 min., the work of No. 444 with so heavy a load was very creditable.

I have recently been turning over some old records, and have unearthed among them one—sent from a correspondent in Canada—which will fittingly conclude the present article. The *venue* of the run in question has not previously figured in these columns, while I have not for many years seen any details in print of the work of the type of engine employed, which was one of the handsome London and South Western outside cylinder 4–4–0 engines of Mr. William Adam's design, No. 571. Although this was the popular 6.40 p.m. express from Waterloo to Portsmouth, the load—only 5 years ago—was merely four 8-wheelers, well-filled, weighing 160 tons behind the tender. The start was remarkable, Clapham Junction being passed in 6 min. 35 sec.; Wimbledon in 10 min. 19 sec.; Surbiton in 15 min. exactly; Weybridge in 21 min. 41 sec.; and Woking in 26 min. 50 sec. Thus the average speed from Clapham Junction to Woking was 60·4 miles per hour, of which stretch the 7⅓ miles from Surbiton to Weybridge were covered at no less than 64 miles per hour. Guildford, 30½ miles from Waterloo, was reached in 35 min. 33 sec., against a booking of 38 min. The present booking, by the way, is 41 min., now that corridor stock and restaurant cars are in use. From Guildford the 12½ miles to Haslemere were covered start-to-stop in 19 min. 3 sec., against 20 min. booked, the uphill work on this steep stretch being particularly fine. Leaving Haslemere, Liphook, 4 miles, was passed in 5 min. 1 sec.; Petersfield, 12 miles, in 12 min. 25 sec.; and Rowlands Castle, 20¼ miles, in 22 min. 11 sec., but a slight check here for signals was succeeded by a worse one at Havant Junction, and a dead stand at Havant West box for 1 min. 32 sec. The 23½ miles from Haslemere to Havant were covered in 29 min. 41 sec., or 28 min. net, while the 6½ miles from Havant to Fratton occupied exactly 9½ min., start-to-stop. Even then only 1¾ min. had been lost on the 40-min. booking from Haslemere to Fratton. My correspondent remarks that the driver "knew he was being clocked," but that does not by any means detract from the excellence of the work performed.



Photo] [*A. Richardson.*

GREAT WESTERN RAILWAY.

Bristol Express leaving Oxford.

4-4-0 Locomotive No. 4102 *Blenheim.*

Digitized by Google

Leaves from the Log of a Locomotive Engineer [No. XXVII.].

By ROBERT WEATHERBURN.

IN giving these further reminiscences I have been largely influenced by friends and readers of the RAILWAY MAGAZINE who have so kindly expressed their approbation of my contributions thereto, including not only my recent writings, but also articles published in these pages many years ago.

In March, 1913, an illustration was given of one of the four wheels coupled engines built by Messrs. Kitson & Co., Leeds, for the Tamboff and Saratoff and Tamboff and Kasloff Railways, Russia, in the years 1868–9. These were erected in the Prince of Leuchtenberg's Fabrique in St. Petersburg, and later tested with approved loads between there and Peterhoff. During the official trial an incident of a painful and vexing kind occurred, which, taken in connection with recent events, may be of interest. I may premise this by saying that my employers, Messrs. Kitson & Co., were naturally very desirous that their first essay in Russia should be a great success, as the German firms of "Schwartzkopf" and "Borsig" of Berlin, and the French firms of "Schneider" and "Guion," practically held the Russian business in their hands. The locomotives were erected under the personal inspection of two of the heads of the Tamboff and Saratoff Railway, Herr Schwabé and another whose name I have forgotten. Herr Schwabé represented what we call in England the Running Department, and the other gentleman the Bureau Natchalni Trakti, or Chief Engineer of Traction.

At that time a large percentage of the heads of the mechanical departments in Russia were Germans, chiefly Prussians, whose influence was more or less used on behalf of their compatriots. Indeed, many of them were well known to be unofficial agents of German firms, and in receipt of commissions for all orders obtained; so that it will be readily understood that the advent of leading English firms was viewed with acrimonious jealousy by all Germans in whatever position on Russian Railways.

The engines were dispatched from England complete in every respect (but not erected) with the exception of the two injectors, which had been stipulated to be of the type called "Schau," which claimed to be unfreezable—(a misnomer)—and these were to be sent direct from Magdeburg to the Leuchtenberg Fabrique in St. Petersburg, probably on account of cost of carriage; but of this I am not sure. Now the Schau injector was not only much shorter, but also larger in the barrel than the injectors in use in England at that time. A sketch giving the length, with dimensions of steam and water-way flanges, was all that had been sent to Kitson & Co. Of course, the position most suitable as regards protection from the cold and snow was also suggested and carried out by the firm.

Kitson & Co. had hitherto used the ordinary telescopic or movable cone injector (as supplied at that time by the firm of Sharp, Stewart & Co., Manchester, who were the original agents and makers, having obtained the concession from the French inventor), but used their own standard steam cocks placed on the crown of boiler. The apertures of these cocks and those of the steam pipes were $\frac{7}{8}$ in. in diameter, this being ample for the type of injector used in England, whereas the Schau required a volume of steam at least equal to the capacity of $1\frac{1}{8}$ in. pipe and cocks for high pressure. This essential feature had either not been mentioned by the Schau people, or been overlooked, hence the steam pipes sent out from Leeds were $\frac{7}{8}$ in. calibre as stated.

The delivery of the engines was very much behindhand, and being urgently needed erection was pushed forward by day and night. The day of trial of the first engine was fixed for Saturday, which allowed no time for any preliminary tests of joints, etc., to be made, beyond raising steam and changing the water afterwards so as to prevent priming.

Digitized by Google

Saturday found the two Tamboff and Saratoff engineers with a third official from the Nicolai Railway (also a German) in evidence. The engine was duly moved out into the adjacent goods yard, and on the way I tried the injectors at 7 and 8 atmospheres = 100–120 lbs., and experienced a little difficulty at the latter pressure in getting them to work. We had previously taken in water and wood, the latter mainly composed of silver birch in short round logs about 16 in. in length, and from 6 to 10 in. in diameter. The train was composed of 24 wagons, all screw-coupled and loaded with new steel rails made by a Russian firm in the locality, the trained staff of which were exclusively Belgians. I roughly estimated the load to be from 250 to 300 tons, as no certified weights were available. The run was to Peterhoff, the configuration of the road being practically level. We started with a clean full glass and blowing off at nine atmospheres (135 lbs. per sq. in.).

Now in order to show the indifference to, and capacity to bear pain and suffering, to which I alluded in one of my former chapters, it is necessary for me to hark back a little. During the process of raising steam in the Leuchtenberg Fabrique, Gregowski, a fine type of a Russian handyman, had been splitting some of the larger logs of birchwood (for which purpose two sharp axes were supplied in the tool list), when he was suddenly called on to give assistance in pinching for gland packing. Promptly and without thinking, he jumped from the footplate to the ground, axe in hand. I noticed his activity in discarding the use of the steps, and then, after a momentary halt, he retired behind the tender. Thinking there was something unusual, I followed him after a short time, and found him holding the edges together of a long deep wound in the upper fleshy part of the thigh, from which the blood was flowing. The sudden jump while holding the axe blade downwards had, in the recoil, inflicted a deep gash at least 3½ to 4 in. long, but, fortunately, lengthways.

I ordered immediate treatment and for the man to be sent home, but to all my injunctions, however peremptory, he simply replied, "Nichevo Gospodin," "Nichevo nenader"—"never mind, its nothing; I must go with the engine on trial"—and in spite of my endeavours to prevent him doing so, he proceeded to stuff the gaping wound with a portion of his rough and not over-clean shirt, and then bound it up with a big red muffler, which he in turn suspended from his waist-band to keep it from working down. I saw no more of him until we had got fairly started on our journey, when, to my surprise, I noticed him on the tender acting as wood chopper to the fireman. It was then too late for further action on my part.

To resume, no engine ever made a more brilliant and promising start. All exquisitely clean, a well-laid wood fire (the firebox chockful, even slightly above the bottom of firehole, as per custom), the footboard without any disagreeable lingering coal dust to be washed down and swept up, the brass and other armature fittings shining in a way that would have filled the heart of the most captious Yorkshire or Lancashire housewife with despair and envy, the damper notched up to only one-half its range, the exhaust well timed and clear and as resonant as the huge unwieldy American chimney would allow without being stertorous or too violent, and the safety valves now playfully protesting their inability to hold their own.

It was a cold, fine, frosty day in December, and at no time do the environs of St. Petersburg look so clean, crisp and sprightly as when the first frost gems and bejewels every tree, shrub or other coign of vantage. Notched up to the right degree of expansion, the engine seemed endowed with a sense of the importance of doing its best for the honour and credit of English skill and enterprise. Things were jubilant, and even the stolid hypercritical German officials reluctantly admitted that such was the case; but it was soon time to put an injector on, as the water was showing well below the top nut of the gauge frame.

It must be remembered that the injectors of those days were at the best not so easy to start or control as the present ones. The best required a little preliminary coaxing and humouring according to pressure and height of water in tank. In spite of water *ad lib* and the most careful manipulation of steam, it blew through. Again and yet again with the same result, both failed to respond. Every dodge or trick known to me was of no avail, and by this time the safety valves were blowing off angrily. Inside the firebox was one mass of lambent flame.

The inspector who was acting as driver seemed to relish the situation by giving her the full head of steam, and shrugging his shoulders deprecatingly and exchanging significant looks with his colleagues. The water by this time was falling rapidly in the gauge glass. I had already partly damped down, when it suddenly struck me that the

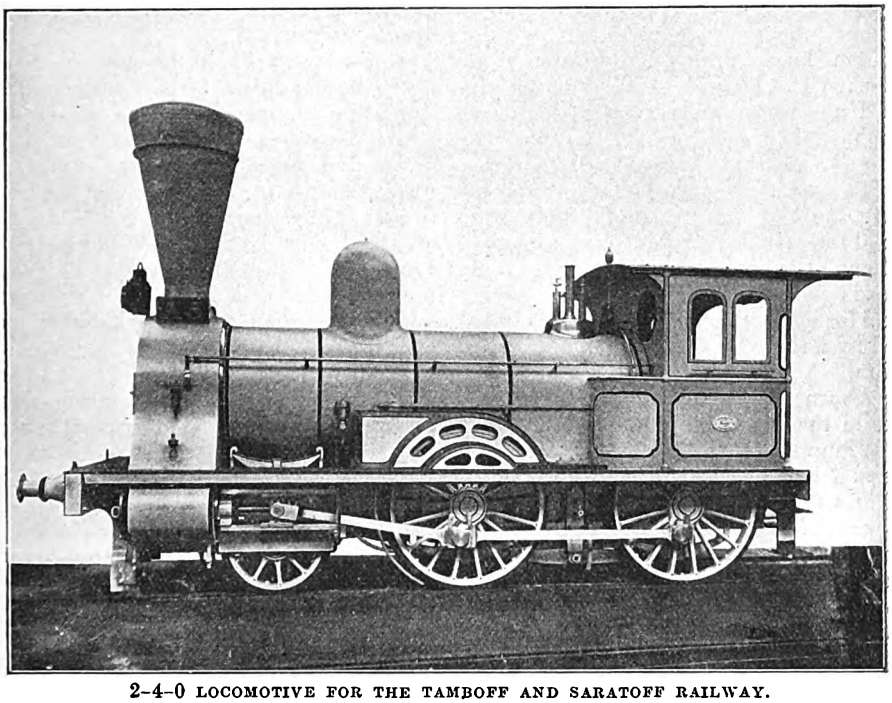
Digitized by Google

cause was due to the stricture of the steam pipes, [Parenthetically I may remark that the fault was not a question of pressure but of want of volume of steam necessary to gauge the much larger barrel of the Schau]. I hurriedly and unceremoniously pushed the driver aside and seized the dart with the intention of dropping the fire by pulling up the fire bars, but one glance at the fire made me realise that such intention would be futile owing to the impossibility of forcing a passage through the tightly wedged mass of burning logs.

To stop I dare not, as I was afraid the water would fall below the crown plate of the firebox were steam completely shut off, and then I knew with such a fire the action of the lead plug if melted was uncertain. Many a man has been in such difficulties, but, with a new venture in which I was interested as though it were my own, hampered with four men on the engine footplate, three of whom were out of sympathy, nay, as I knew and felt, inwardly chuckling over the probability of the crown plate being burnt, and possibly some of the upper rows of tubes and the after gratification it would afford in relating the fiasco, was an experience that put me in a very un-Christian-like temper. Yet stop I must and did, and the water could be now and then just discerned like a fluctuating crystal bead deep in the bottom nut of gauge frame.

In my excitement I overlooked my incipient German and cleared the footplate by the use of a few strong but telling English words, and then I again tried vainly to get the dart through. A wood fire burns rapidly under blast, and by this time it had burnt some little distance below the fire hole. I glanced over the hand-rail wistfully at the frost-hardened snow and found the overflow from the injector on the left side had thawed it and a little of the underlying ballast. In a moment I opened the steam cock a trifle so as to heat the overflow from the tender, and the gravel ballast soon thawed and became amenable to the shovel which was part of our equipment.

I was alone on the footplate of the engine, Gregowski being still on the tender watching every move of mine with what I knew to be real sympathy and a desire to help. I had but a very limited vocabulary of Russian words at my disposal, but such as I had were as forceful as they were few, and he soon grasped my meaning. Seizing the shovel, he got down and attacked the rapidly thawing



2-4-0 LOCOMOTIVE FOR THE TAMBOFF AND SARATOFF RAILWAY.
Built by Messrs. Kitson & Co., of Leeds.

Digitized by Google

ballast, flinging it on the footplate whence it was quickly transferred to the fire, and in a short time I was rewarded by feeling no further apprehension as to lead plug or crown plate. Still, I made doubly sure, and as the pressure lowered to 7 atmospheres, again used the injectors to fill up. By this time a goods train had drawn up behind, and the German " betriebs " inspector suggested the advisability of uncoupling, *i.e.*, taking the connecting rods off so that no harm would befall the pistons during the process of being pushed to our destination, but knowing that such a procedure would only complicate matters by delaying the traffic and add to the publicity of the failure, and having confidence in the two Kessler pump lubricators (one on each cylinder), which, like the modern Furness, only came into action when the pistons were acting as air pumps, I positively refused and stated that the responsibility would be solely mine. It is needless to say that during the disheartening and to me somewhat humiliating process of being pushed to Peterhoff, that the suction lubricators received my personal special attention by constantly filling, and afterwards when the cylinder covers were taken off for inspection my decision was fully justified by finding the cylinders in first-class condition.

Then I turned my attention to remedy the mistake in the steam pipes and cocks. The latter I found could be enlarged in their orifices sufficiently, without weakening them, and after a few enquiries I found a coppersmith who supplied me with larger pipes, utilising the original flanges and taking the discarded ones as part payment. At the next and every subsequent trial our German inspectors were absolutely unable to find the least opportunity to complain or even to suggest anything.

However provoking and unpleasant this incident was, the more so on account of our first essay, it proved beneficial to me in the long run, as I then made a hard and fast resolution that however pressed for time, the fullest care should be given in thoroughly testing any new apparatus, particularly injectors under every condition of pressure or practice before submitting to official trials. The Schau injectors were by no means what they claimed to be—namely, unfreezable. They required a larger volume of steam than any other I ever saw in order to rope the water across. The claim of being unfreezable was simply based on the facility of drainage after use.

A few words about Gregowski, how the poor fellow endured the pain of the undressed wound for so long a time, and rendered such active assistance when called upon I could never understand, but many times afterwards the seeming indifference of the Russian to pain, hunger and death, struck me as one of their most remarkable characteristics. Immediately after our arrival at Peterhoff he preferred food to a doctor, and ate a hearty dinner with much relish. The doctor probed and proved the wound to the bone, and seemed in no ways surprised at the endurance shown, as little or no consideration seems to be given by the medical or surgical faculty to the feelings of their casual patients. The rough and ready idea of tearing off and rolling up a portion of his shirt and thrusting it into the wound and holding in its place with the improvised bandage, most certainly answered its purpose as a successful styptic, but a more painful one I can hardly imagine.

Digitized by Google

Exceptional Locomotives in British Design and Practice [No. II.].

By J. FRANCIS.

IT is now necessary to deal with articulated designs, a prolific field for present review. Three principal methods of design are in use of English introduction, the Fairlie, Garratt and Kitson-Meyer, while the Mallet type is gradually finding favour also in British practice for abroad.

In the Fairlie design two boilers, distinct or with connected or common fireboxes, are carried on a girder frame, which is mounted on two bogies to which the cylinders are attached to drive the respective sets of coupled wheels. The Meyer or Kitson-Meyer type also uses two bogies carrying the cylinders, but one boiler only is used, with provision for separate exhaust from the rear bogie through the bunker tanks. In the Garratt type the bogies are fitted so that the boiler frame is supported between them, thus allowing of almost unrestricted boiler dimensions. The characteristic of the Mallet type is that the rear coupled wheels are attached to the engine frame, while the front bogie is arranged in a frame swivelling under the boiler and hinged to the main frame.

The great advantage is that, with the Fairlie type, two small boilers can be used instead of one and the weight is distributed over a long wheelbase, in some cases sufficient to ensure that on smaller bridges and culverts the weight of more than one section can never come upon them at the same time; while in all designs great flexibility is realised although more driving wheels are available than would be practicable under usual conditions.

Fig. 10 illustrates a Fairlie engine built several years ago for the Mexican Railway by Neilson Reid & Co., Ltd., now part of the North British Locomotive Co., Ltd. Here the boilers are connected, with the steam dome on one section only. Cylinders are 17 in. by 25 in.; wheels, 4 ft. diam.; each wheelbase is 9 ft. 3 in. and the total 35 ft. 6 in.; steam pressure, 200 lbs. per sq. in.; heating surface (total), 2,376 sq. ft.; grate area, 43½ sq. ft.; tank capacity, 3,500 gallons; fuel space, 315 cub. ft.; weight in working order, 120 tons 2 cwt.

What is claimed to be the largest "Fairlie" articulated engine yet constructed is used on the standard gauge lines of the Mexican Railway, and was constructed by the Vulcan Foundry Company, of Newton-le-Willows, Lancashire. The recognised characteristics of the "Fairlie" type are retained, there being two sets of coupled wheels arranged in pivoted trucks, while the boiler is in two sections, having a large firebox, fired from one side, common to both. The total weight, all of which is available for adhesion, is 138 tons, and this easily makes it the largest engine ever constructed in Great Britain, especially if the tender weights of very large engines of other classes are not reckoned. Included in the equipment are Richardson balanced valves; reversing gear by wheel, bevel gear, worm and quadrant on flexible shafts and air locking device; Detroit triple-feed, sight-feed lubricators; hand sanding devices; Westinghouse brake mechanism with signal connection for engine and train, and counter pressure brakes for control when descending long inclines.

A well-known example of the "Fairlie" type is that built by the Vulcan Foundry Co., Ltd., of Newton-le-Willows, England, for the Burma railways (3 ft. 6 in. gauge). The design, though a remarkable one, is a development of that introduced in 1901, when the first engines of this class were constructed by the same firm. By the employment of this design a powerful machine is obtained that can be controlled by one driver with, perhaps, two native firemen, although each section is equivalent to an engine of small dimensions and that is light on the permanent way. In this case there are two separate boilers, though carried on the same frame. These engines are used for the mountain sections, and in places have to negotiate grades as steep as 1 in 27 with fair loads. Two of the four bunkers are used for fuel and two for water, but as the water stations are in places a long distance apart a tender is generally attached,

Digitized by Google

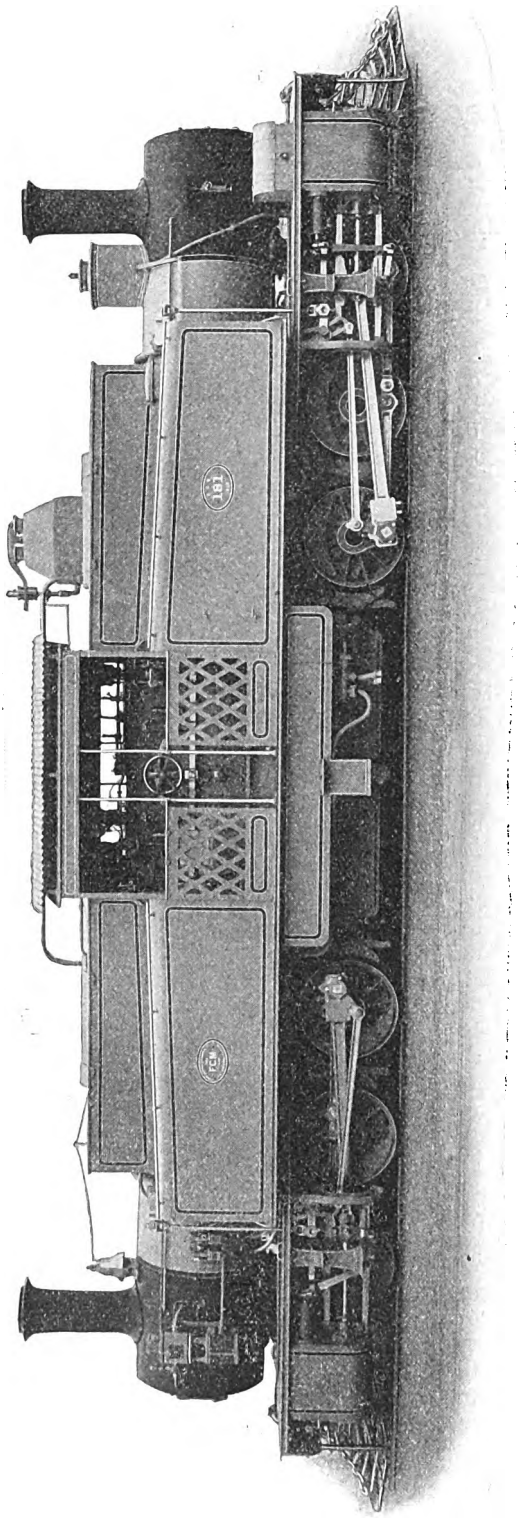


FIG. 10. "FAIRLIE" ARTICULATED LOCOMOTIVE: MEXICAN RAILWAY. Built by the North British Locomotive Co., Ltd.

from which the engine tanks are refilled as required.

Dealing with the Mallet type, the first engines of this class to be built in the United Kingdom were supplied by the North British Locomotive Co., Ltd., for use on the Peking-Kalgan section of the Chinese Government Railway. The low-pressure cylinders are 18 in. and the high-pressure cylinders 28¾ in. in diam., with a common stroke of 28 in. The drivers are 51 in. in diam. The rigid wheelbase is 9 ft. 8 in. and the total wheelbase of the engine 29 ft. 4 in. The heating surface is as follows: Tubes, 2,425 sq. ft.; firebox, 166 sq. ft.—an aggregate of 2,591 sq. ft. The firegrate area is 45 sq. ft. Steam is used at a pressure of 200 lbs. per sq. in., and the tractive effort at 50 per cent. of the boiler pressure is 35,576 lbs. The total weight of the engine in working order is 96·5 tons, the whole of which is available for adhesion.

These engines are stationed at Nankow, at the foot of the Pass, and they lift the trains to Ching Lung Chiao, a distance of 13 miles; the average train load is about 180 tons, exclusive of the locomotive. In order to obviate the possibility of the train breaking away, the engine pushes the load from the bottom of the Pass to the apex of the summit zigzag, where a smaller locomotive picks up the train and hauls it on to Kalgan.

Fig. 11 illustrates the latest development of the Mallet type in British hands, representing one of the superheater 2-6-6-0's now being introduced on the South Africa Government Railways. These engines have been built by the North British Locomotive Co., Ltd. Cylinders are 18 in. and 28½ in. diam., with a stroke of 26 in., coupled wheels are 3 ft. 9½ in. diam., and bogie wheels 2 ft. 4½ in. Rigid wheelbases are 8 ft. 4 in. and the total 33 ft. 5 in. Steam pressure is 200 lbs. per sq. in. Heating surface is 2,214 sq. ft., with 580 sq. ft. added by the Schmidt superheater. Grate area

Digitized by Google

is 42·5 sq. ft., adhesion weight is 86 tons 7 cwt., and total weight of engine in working order is 95 tons 2 cwt. The tender weighs 51 tons loaded, and the total wheelbase of engine and tender is 59 ft. 11¾ in.

For many years the Burma Railways have employed articulated engines, but hitherto these have been of the Fairlie type. In the latest engines supplied the Mallet type is adopted, and one of them, constructed by the North British Locomotive Company, is illustrated in Fig. 12. The gauge is 1 metre; but, owing to the severity of curves, it would be almost impossible to comply with requirements except by means of articulated engines.

The boiler is of a large size, fitted with a Belpaire firebox, and rests on three saddles or supports, the centre one sliding on a bronze liner, while the front one serves for controlling the sideway movements of the leading section of the engine frame on curves. In addition to steam brakes on the engine and vacuum brakes on the tender and for controlling the train, a Meyer counter-pressure brake is employed for use on long down-grades, and the muffler for this is placed on the boiler immediately behind the chimney.

We may also mention the articulated compound 0–6–6–0 Mallet engines, built by the North British Locomotive Company, Limited, for the Uganda Railway, and illustrated in these pages a few months ago. These engines have been devised to haul a load of 170 tons up a long gradient of 1 in 25 at 6 miles, and a load of 200 tons up a bank of 1 in 40 at 12 miles per hour, and in each case round curves of 337 ft. radius. The locomotive has an over-all length of 62 ft. 2⅝ in., the total wheelbase of engine and tender being 48 ft. 7 in. The forward low-pressure cylinders have a diameter of 24¼ in., while that of the high-pressure cylinders is 15½ in., the stroke in each case being 20 in. The driving wheels have a diameter of 39 in. The rigid wheelbase is 8 ft. 3 in.; the total wheelbase of engine 24 ft. 3 in. The boiler tubes have 1,398 sq. ft. of heating surface, while that of the firebox is 115 sq. ft., representing an aggregate heating surface of 1,513 sq. ft. The fire-grate area is 33 sq. ft. The working pressure of the steam is 180 lbs. per sq. in. The weight of the engine in working order is 59 tons 17 cwt., the whole of which is available for adhesion. The tender has a water tank capacity of 2,000 gallons, with a fuel space of 270 cub. ft., and in loaded

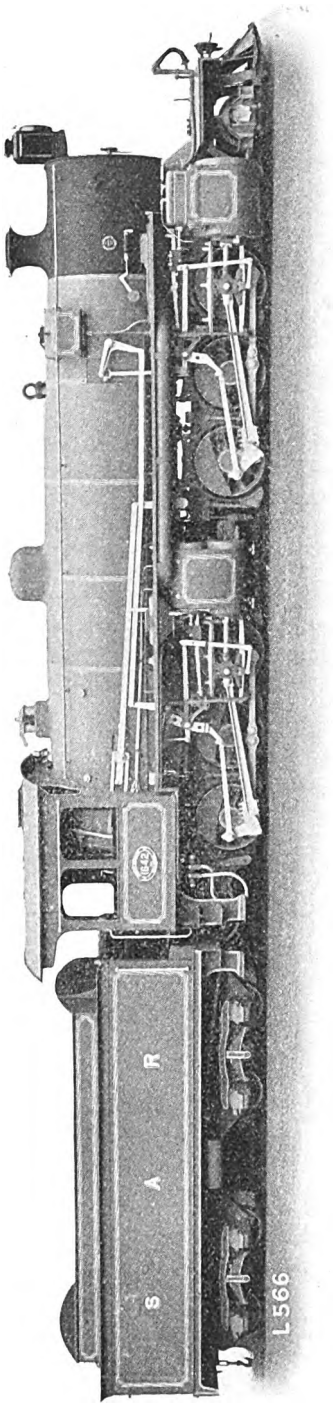


FIG. 11. MALLET ARTICULATED (SCHMIDT SUPERHEATER) LOCOMOTIVE: SOUTH AFRICAN GOVERNMENT RAILWAYS (3 FT. 6 IN. GAUGE).
Built by the North British Locomotive Co., Ltd.

Digitized by Google

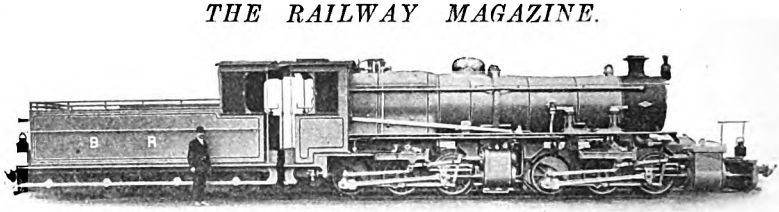


FIG. 12. MALLET ARTICULATED LOCOMOTIVE (METRE GAUGE): BURMA RAILWAYS.
Built by the North British Locomotive Co., Ltd.

condition weighs 31 tons 14 cwt.—a total weight of 91 tons 11 cwt. for the complete locomotive.

An interesting locomotive supplied by Messrs. Andrew Barclay Sons & Co., Ltd., of Kilmarnock, Scotland, for an industrial railway in Greece, is illustrated in Fig. 13. It differs from the articulated engines already described in that there are two pivotally mounted sets of coupled wheels operated by two pairs of high-pressure cylinders supplied from a single boiler. The engine, therefore, belongs strictly to the Meyer duplex type, now little used, though at one time it bid fair to be in considerable favour and would probably have been introduced still still more largely had it not been for the Mallet compound articulated design, which has superseded it in most cases.

The conditions required considerable hauling power on very light rails with numerous sharp curves on steep grades; and it was considered that the requirements could be best met by the adoption of a duplex design.

The gauge is very narrow, only 2 ft. 5½ in., so that the designers were considerably hampered; but this provided a further reason for the adoption of this design, as the tractive effort could be divided over a multiplicity of driving axles spaced over an extended wheelbase. As a result a comparatively large and powerful machine is provided, having eight wheels available for tractive power and well spaced out, so as to distribute the load, all of which is utilised for adhesion, while ample flexibility in service is provided.

Boiler, water tanks and coal bunkers are supported on a main frame, running the full length of the engine. This frame is carried by two four-wheeled bogies, each provided with a separate set of engines with Walschaert valve gear. The steam supply is furnished for both sets of engines by one boiler, and ball and socket joints on the steam pipes permit the bogies to assume any position within their range of movement. The exhaust from the front engine takes place in the usual way; that of the rear

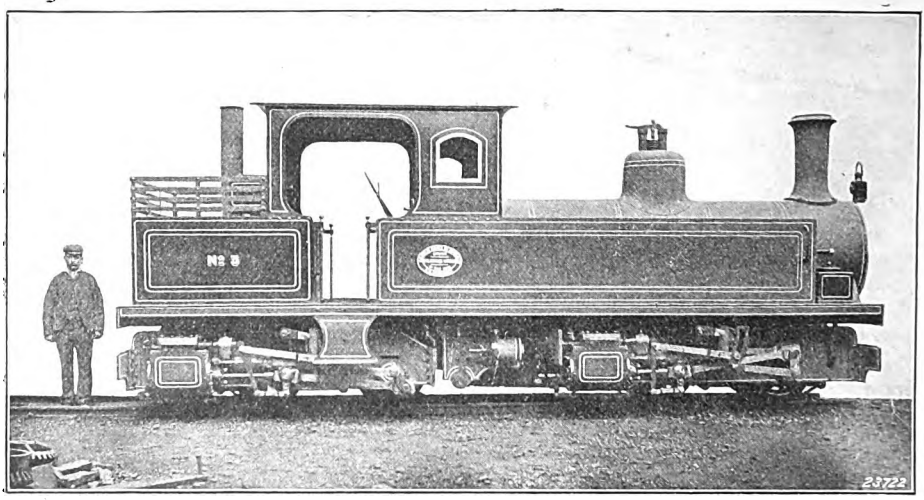


FIG. 13. ARTICULATED LOCOMOTIVE FOR INDUSTRIAL TRAFFIC.
Built by Messrs. Andrew Barclay, Sons & Co., Ltd.

Digitized by Google

engine is provided for by a special chimney passing through the coal bunkers.

Articulated locomotives constructed according to the system designed by the late Mr. H. W. Garratt have been introduced in considerable numbers during recent years. Of engines previously constructed may be mentioned the original Tasmanian 0-4-0–0-4-0 class, the much larger 4-4-2-2-4-4 and 2-6-2-2-6-2 series for the same railways and the Western Australian 2-6-0-0-6-2 class, besides a few others. A later example, for the San Paulo Railway of Brazil, of the 2-6-0-0-6-2 design, for use on metre gauge lines, is fitted with Belpaire firebox, Walschaert valve gear and other features. During 1913 a Belgian firm, La Société du St. Leonard, built under licence from Messrs. Beyer, Peacock & Co., some narrow gauge engines of the same class, for use on the Congo Railway.

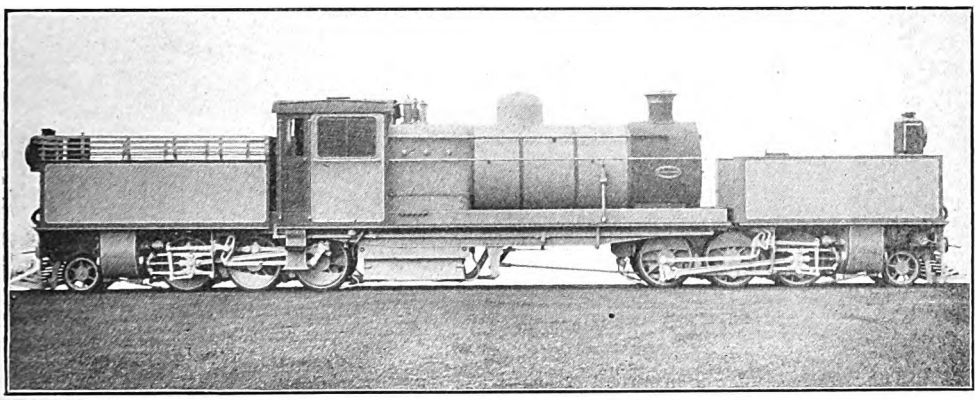


FIG. 14. "GARRATT" ARTICULATED LOCOMOTIVE: SAN PAULO RAILWAY.
Built by Messrs. Beyer, Peacock & Co., Ltd.

Locomotive illustrated in Fig. 14 is a notable example of this method of design, and includes a number of features of special interest. It was constructed by Messrs. Beyer, Peacock & Co., Ltd., of Manchester, for the San Paulo Railway of Brazil (metre gauge). The outstanding characteristic of the "Garratt" design is the fact that the boiler is, as it were, carried bridge fashion upon two engine trucks, so that boiler and firebox dimensions are in no way restricted by the mechanism, and great flexibility on curves is obtained. They were built to the designs of the engineers of the railway, in collaboration with the builders. A noteworthy feature of the design is the fact that very equable weight distribution is obtained, notwithstanding the apparent difficulty of doing so. The centres of the two bogies are no less than 26 ft. 3 in. apart. Yet the boiler never deviates sufficiently far from the centre line of the track to cause difficulties, even at fairly fast speeds, and the overhang of the parts on the sharpest curves is never serious. In fact, in this respect the design compares favourably with many of the large Mallet articulated engines in service. Piston valves actuated by Walschaert gear are employed. Pipe connections cause no trouble, ball and socket devices being employed for the steam transmission where necessary.

Reference may also be made to the remarkable "Garratt" engines introduced on the Tasmanian Government Railways, though these were described in the RAILWAY MAGAZINE for December, 1912. The initial engines of the "Garratt" type were supplied for use on the 2 ft. gauge lines in Tasmania. These proved the working capabilities of the type, with the result that Mr. W. R. Deeble, Chief Mechanical Engineer, in conjunction with Messrs. Beyer, Peacock & Co., Ltd., of Gorton Foundry, Manchester, developed the "Garratt" design in two large and remarkable classes—one for passenger and the other for goods traffic—to work certain main line sections of the Tasmanian Government Railways (3 ft. 6 in. gauge). The two classes are illustrated in Figs. 15 and 16.

These locomotives are designed to conform to a variety of difficult and rigid requirements for which the employment of the "Garratt" system afforded the only solution. The passenger engine embodies two groups of four-coupled wheels, operated by four cylinders, with an inner pair of carrying wheels and an outer four-wheeled bogie. In fact, the design constitutes a duplex

Digitized by Google

Digitized by Google

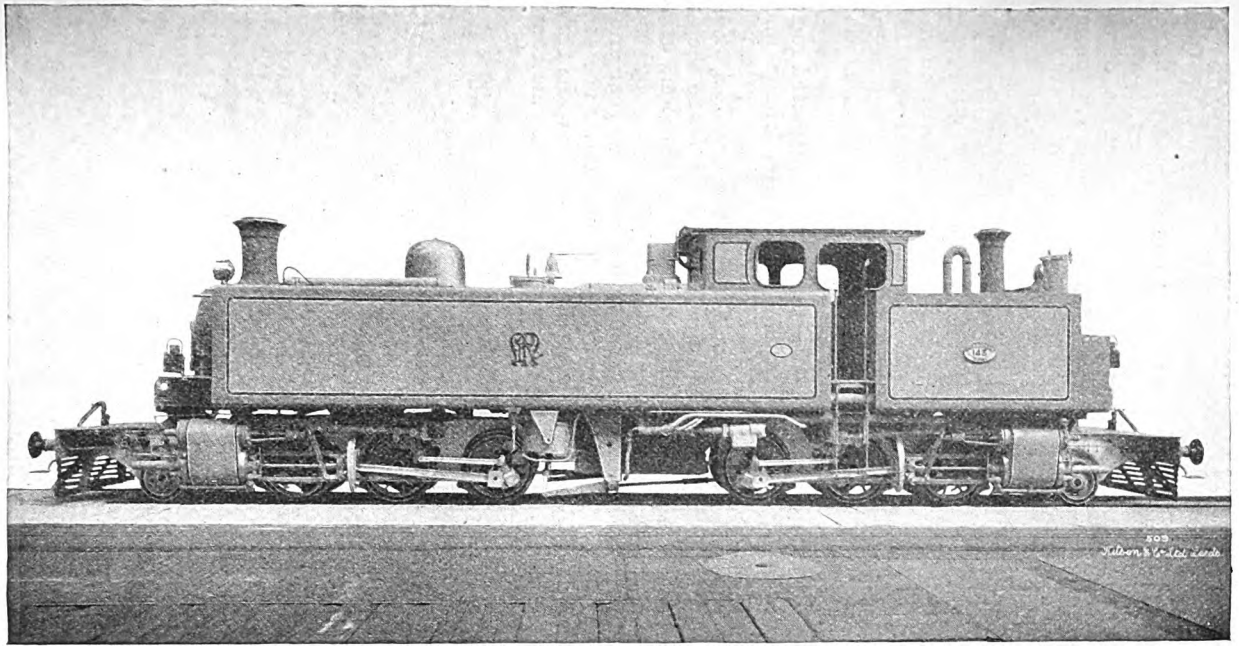


FIG. 17. KITSON-MEYER ARTICULATED LOCOMOTIVE (FITTED WITH ROBINSON SUPERHEATER): MANILA RAILWAY.

Cylinders (4)	16″ dia. × 20″ stroke	Heating surface :—	
Diameter of coupled wheels	3′ 3″	Firebox	136·5 sq. ft.
Coupled wheelbase	9′ 0″	Tubes	1,612·2 ,, ,,
Bogie wheelbase	14′ 11″	Total	1,748·7 ,, ,,
Total wheelbase	41′ 7″	Superheater	352·0 ,, ,, (inside)
Boiler working pressure	160 lbs. per sq. in.	Grate area	35·0 ,, ,,
Capacity, tanks	3,000 gallons	Fuel capacity	4 tons coal
Total weight of engine in fully loaded condition			94·75 tons

Digitized by Google

largest ordinary goods engines in service. Boilers correspond in both designs, and other parts are as far as possible interchangeable. Absence of side tanks and of wheels below the boiler—both characteristic features of the "Garratt" system—has permitted the provision of a large boiler with a wide and deep firebox of the Belpaire pattern, coupled with a reasonable length of boiler barrel. The extreme accessibility of the boiler for washing out purposes will be recognised. Provision is made for using oil fuel, if desired, owing to the fact that in Tasmania important shale deposits have been found, which render it probable that oil fuel will be used on its railways in the near future.

Principal dimensions of the goods locomotives are as follows :—

Cylinders (4)	15 in. × 22 in.
Outer wheels	2 ft. 3 in.
Coupled wheels	3 ft. 6 in.
Inner wheels	2 ft. 3 in.
Boiler—length	10 ft. 11 in.
,, diam. at front ends	5 ft. 3⅜ in.
Height of centre line	7 ft. 3 in.
Heating surface—Tubes	1,530·5 sq. ft.
,, ,, Firebox	155·5 sq. ft.
,, ,, Superheater	333 sq. ft.
,, ,, Total	2,019 sq. ft.
Grate area	33·9 sq. ft.
Steam pressure	160 lb.
Wheelbase of each section—	
Rigid	8 ft.
Total	17 ft. 8 in.
Extreme wheelbase	56 ft. 8 in.
Distance between articulating centres	29 ft. 8 in.
Adhesion weight—front engine	28 t. 9 c. 1 q.
,, ,, hind engine	28 t. 9 c. 3 q.
Total weight—front engine	44 t. 14 c. 3 q.
,, ,, hind engine	45 t. 5 c.
Aggregate weight in working order	89 t. 19 c. 3 q.

In conclusion reference may be made to the Kitson-Meyer type, which has been developed in a remarkable degree for South American use. Fig. 17 illustrates the main features. There are two sets of coupled wheels, each with a pair of carrying wheels, and mounted in a pivoted frame. All cylinders are high pressure, those of the rear truck exhausting through a special chimney at the rear. These engines are used for the Manila Railway, and are further interesting in that they are fitted with the "Robinson" superheater, draught retarder, piston-valves and pressure release valves, and that condensing apparatus is provided.

Another remarkable articulated rack locomotive, built by Messrs. Kitson and Co., Ltd., on the Kitson-Meyer principle, for the Argentine Transandine Railway, may also be mentioned. In this case the engines can proceed either by adhesion, using the leading 8-coupled wheels, or by the rack mechanism operated by the rear engine, or both can be used together. The engine is also adapted for condensing while traversing the tunnels which occur on this route.

Digitized by Google

MANSION HOUSE STATION, METROPOLITAN DISTRICT RAILWAY, AS REMODELLED TO FACILITATE TRAFFIC WORKING.

Railway Electrical Progress and Practice.

By "IND.CATOR."

IN view of the extensive uses of electricity for railway purposes, and the growth of electric traction and electrical working, it is thought that the time has come for the electrical side of railway progress and practice to receive a permanent place in the pages of the RAILWAY MAGAZINE. In these articles, therefore, special attention will be given from month to month to various phases of railway electrical engineering. The field contemplated is a wide one, ranging from the more obvious applications, such as electric traction, power signalling, etc., to station and yard lighting, special telephonic and like installations, power in stations and depôts, and the hundred-and-one details of railway working wherein the aid of electricity is, or may be invoked.

To some extent it will be necessary to deal with specialities of particular firms, but only as far as the subject matter involved justifies itself; and in the main the writer's objective will be the discussion and presentment of electrical topics and matters of interest involving electrical engineering, more or less on the same lines as has been adopted for many years in reference to steam locomotive engineering and to general railway construction and working.

In many quarters there is an impression that in respect of electric traction development the United Kingdom is seriously behindhand as compared with the record of certain other countries, notably the United States and Germany, and to a lesser extent, Italy, Switzerland, Sweden and Norway. In regard to more or less sensational and revolutionary developments this may be so, for it must be admitted that our record in reference to other than what may be termed "orthodox" practice is by no means large, whereas in other countries one is continually reading of notable installations involving high tension direct or alternating current single-phase or three-phase systems, associated with various novelties of practice in other ways.

There is, however, a very simple explanation of this aspect, that in most cases such special installations are rendered possible by particular conditions, that opportunity justifies experiment on fresh lines, or that isolation enables a selected line to be equipped as desired free of the complications involved by association, actual or probable, with other systems; here, on the other hand, it is hardly possible for any line of importance to be equipped without reference to how it will affect neighbouring and

Digitized by Google

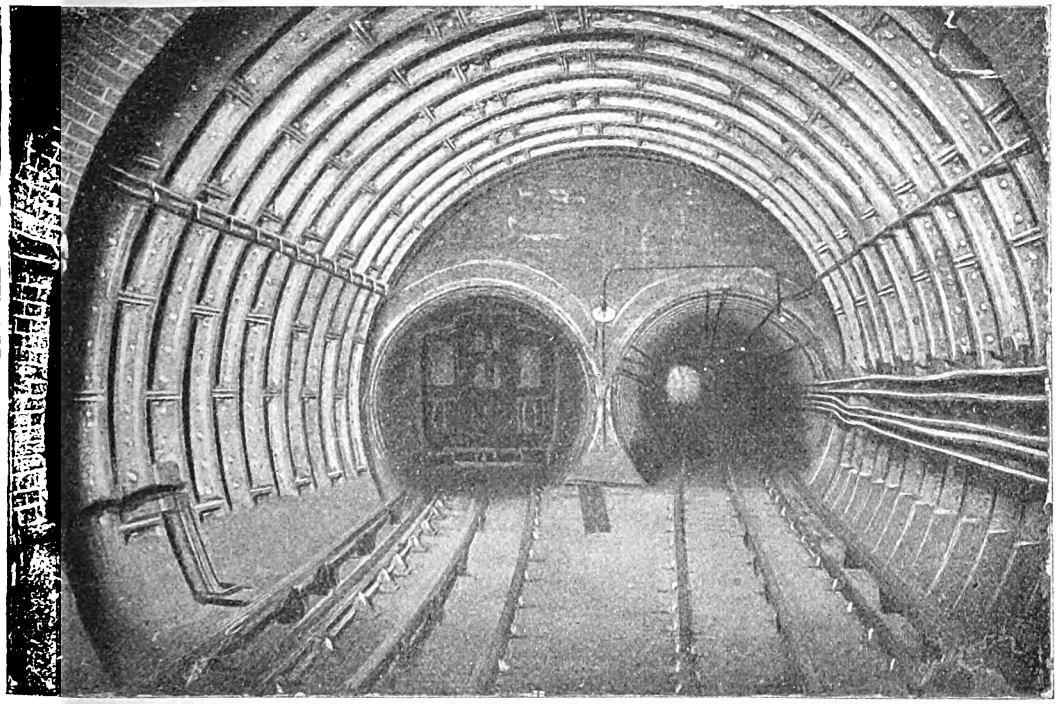
Digitized by Google

associated lines, and where the high cost of electrification is justified it usually follows that the issues involved are far too serious to permit of anything beyond known and well-tried practice being adopted.

A case in point is afforded by the special system in use on the London, Brighton and South Coast Railway. A legitimate extension of the East London Railway electrification would be the revival of the old Shoreditch-Peckham Rye service; but to do that would involve specially equipping the South London line from Old Kent Road to Peckham Rye, as well as the connecting line from Surrey Docks, while at New Cross a similar break of connection will arise when the high-tension equipment is available on that section of the Brighton main line. Again, the West London Extension line is similarly cut off electrically from joining on to the West London electrical equipment, while in the neighbourhood of Epsom, Ashtead and Leatherhead there will be corresponding difficulties of associating directly when the London and South Western electrical equipment is extended to cover that section.

In these instances it is probably correct to argue that as there is no need to reinstate the Shoreditch-Peckham Rye service or any probable desire to run trains from the East London beyond New Cross, such considerations have no weight; or that the Clapham Junction-Addison Road service is sufficiently isolated to permit of either the direct-current installation being extended to Clapham Junction or the overhead equipment to Addison Road, without reference to other factors, while the joint working through Epsom and Leatherhead might well justify dual equipment. Indeed, one may be quite sure that these and other aspects have received due attention on the part of the directors of the London, Brighton and South Coast Railway, and of their advisors, Mr. Philip Dawson and the electrical engineer and his staff. One may even go so far as to acknowledge that if any railway is sufficiently self-contained as to justify electrical equipment on a special system it is the Brighton line, most of the connections with other companies' lines being of a more or less incidental or detail character and justifying special measures where they occur, without prejudicing the general proposition.

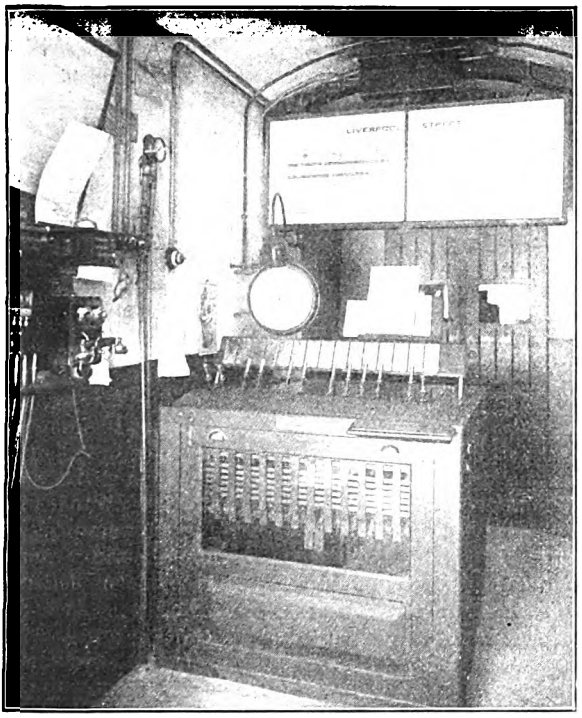
The point is, however, that even this line does involve such complicating factors; and in the case of many other railways these and similar factors count for much more,



TUBE ENTRANCES TO "PICCADILLY" RAILWAY FROM BARON'S COURT STATION.

Digitized by Google

Digitized by Google

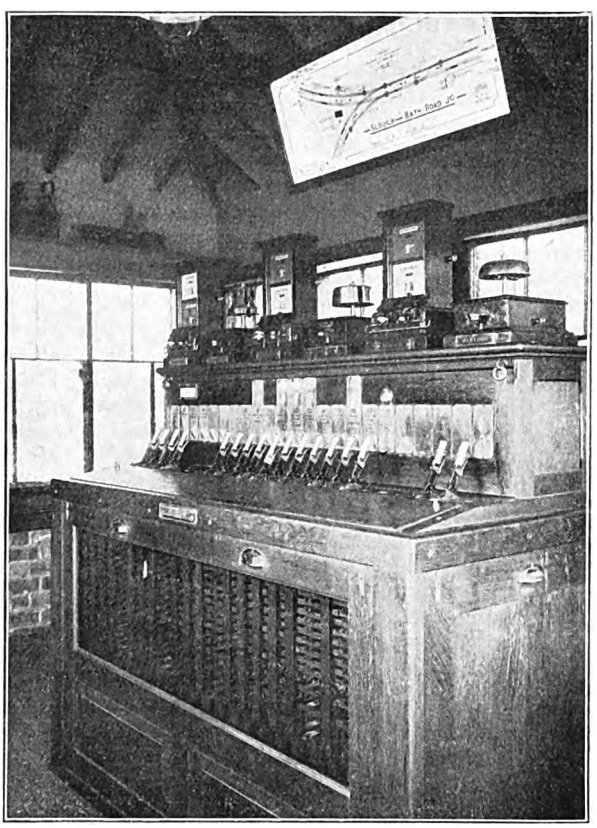


MCKENZIE, HOLLAND AND WESTINGHOUSE ELECTRO-PNEUMATIC SIGNAL FRAME AT LIVERPOOL STREET, CENTRAL LONDON RAILWAY.

This is, perhaps, a somewhat extreme way of stating a case, but it is one which is entirely justified if the probable outcome of the extension of electric traction is anticipated, with, necessarily, some allowance for possible developments in electrical engineering in the course of the years which must elapse before such considerations are likely to become of serious import.

On a smaller scale, however, these problems are even now involved, and it becomes easy to understand why the system of electrification adopted in one case has an influence upon that adopted elsewhere, and so on, from stage to stage. For example, the London and North Western electrification is affected, if not directly governed, by the system adopted on the District and London Electric lines. Suppose, for example, the electrification of the Manchester suburban area is taken in hand: the choice of system may perhaps be influenced by the possibility that, at some date in the future, it may be connected with an extension northwards of the London system, and may itself be governed by the fact that the Lancashire and Yorkshire system is substantially the same, while the Great Central and Midland Railways may also have to adopt a similar method of working because of interconnection between all the railways of the district.

As it is, the Midland Lancaster-Morecambe-Heysham installation is substantially cut off from any other system of electric traction; the Lancashire and Yorkshire Railway's Bury-Holcombe Brook line is similarly isolated; and it may be that the North Eastern Company's Newport-Shildon scheme will similarly be independent. The situation becomes, indeed, more and more involved as possible and probable developments are brought into contemplation; and this goes far to explain why what may be termed "standard" methods of working are most likely to find



MCKENZIE, HOLLAND AND WESTINGHOUSE ELECTRO-PNEUMATIC SIGNAL FRAME AT SLOUGH (BATH ROAD JUNCTION) SIGNAL CABIN, GREAT WESTERN RAILWAY.

Digitized by Google

favour. While isolated, special systems may justify themselves in every way; but directly they become interwoven one with another differences of system and of practice may become of vital importance.

So much for that aspect of the subject, an aspect which is probably more serious in the United Kingdom than in any other country; but at the same time analysis shows that we already have a very commendable record of electrification schemes completed or in progress, a record which is even more remarkable when it is remembered that cost of conversion is usually a very heavy item, the issues involved are in most cases serious, and that a scheme of electrification or new construction requires to offer very favourable prospects before it has much chance of realisation under the conditions which apply here.

As it is, every railway company serving London is involved already in some degree, even if on a very small extent at present. There are, of course, the tube lines, with the Metropolitan and Metropolitan District Railways, and the Midland (L.T. & S. section) equipment to Barking. The London and North Western, North London and London and South Western schemes are each of a comprehensive character, and are already in process of realisation. The Brighton schemes completed or in progress will in the aggregate result in a notable and extensive electrification equipment. In addition, the Great Eastern and South Eastern and Chatham are brought into our subject by virtue of their shares in the East London Railway, while the Great Western is similarly concerned by its joint ownership of the Hammersmith and City Railway and projected connections with the Central London, and the Great Northern by its ownership of one terminus of the Great Northern and City and proposed sharing with the Metropolitan Railway of that line. The Great Central is, in fact, the only company serving London which is entirely outside our subject as regards the Metropolis, but is brought into consideration in other ways by virtue of the Grimsby and Immingham Light Railway and the running of a petrol-electric car.

Outside London we have the Lancashire and Yorkshire and North Eastern electric lines, and the Mersey and Liverpool Overhead lines, besides the further activities of the Midland and Great Central Companies. In fact, there are only the Cambrian, the Welsh lines, and the North Staffordshire (this company has electric canal haulage, as described recently) among the English and Welsh companies which have nothing whatever to do with electric rail traction.

In Scotland, except for the tramway connecting the Cruden Bay station of the Great North of Scotland Railway with the company's well-known hotel at that favourite resort, railway electric traction is virtually *non est*, though it is proposed that the Glasgow District Cable Subway should be electrified. Ireland has several small electric railways, including the first in the United Kingdom, the Giant's Causeway, Portrush and Bush Valley, but the Great Northern is the only large railway concerned, by virtue of the Hill of Howth tramway.

In the aggregate, however, the mileage involved is very considerable. Leaving out of account the London and North Western, London and South Western and North London schemes, and considering only those lines which had electrical equipment at the end of 1913, the following rolling stock statistics are of interest:

	Electric locos.	Motor cars.	Trailer cars.	Tram cars.
Bessbrook and Newry ..	1	2	..	..
Blackpool & Fleetwood ..	..	..	..	37
Central London	2	64	171	..
City and South London	52	..	165	..
Dublin and Lucan.. ..	..	..	..	6
Giant's Caus. P. & B. Val.	2	..	..	..
Great Central	..	..	..	12
Gt. Northern (Ireland) ..	..	..	..	10
,, ,, ..	..	..		1 (goods)
Great Western	..	20	40	..
Lancashire and Yorkshire	..	74	85	..
Liverpool Overhead ..	..	51	..	14
London & South Western	..	17	12	..
London, Brighton & S. C.	..	50	82	..
London Electric	..	168	306	..
Manx Electric	..	..	..	65
Mersey	..	24	37	..
Metropolitan	20	110	207	..
,, (G. N. & City)	1	32	44	..
,, District ..	8	206	218	..
Midland	..	48	49	20
North Eastern	2	66	44	..
	88	932	1460	165

Some of these lines are of tramway character, but as they figure in the Board of Trade railway returns they are included here.

Before concluding this month's contribution it will be of interest to review briefly the present situation in respect of power signalling in reference to which electricity naturally plays a leading part. The British Pneumatic Railway Signal Co.'s low-pressure pneumatic system is, in fact, the only one which is not electric, and then only in respect of installations which are not automatic or semi-automatic. Portions of

Digitized by Google

the London and South Western installation and that of the Great Central Railway between Hyde Junction and London Road, Manchester, are thus non-electric, as regards the actual operation of the signal and point movements, but main line signals and points are interlocked with track circuits, and train location diagrams may be added as at Clapham Junction.

The following sets forth the principal facts concerning power signalling so far installed in the United Kingdom, by no means an insignificant record :

THE BRITISH PNEUMATIC RAILWAY SIGNAL CO., LTD.

Low-pressure-pneumatic (either exclusively pneumatic or with track circuit control). London and South Western Railway (Clapham Junction, and all signal boxes between Woking and Basingstoke ; Grateley, Salisbury, Staines.) Great Central Railway (Manchester district, London Road to Newton, Moor Road, Elsecar Junction).

Electro-Pneumatic. London and South Western Railway (Woking to Basingstoke, automatic signals between signal boxes, four tracks ; Grateley to Andover automatic signals, two tracks). Great Central Railway (Wath Concentration Sidings).

All-electric. Great Central Railway (Immingham Dock, and intermediate signals between Whetstone and Ashby Magna, and between Bulwell and Annesley).

MCKENZIE, HOLLAND AND WESTINGHOUSE POWER SIGNAL CO., LTD.

Electro-pneumatic. Metropolitan District Railway, London Electric Railway, Whitechapel and Bow Railway, Central London Railway (with alternating current track circuits), Great Eastern Railway (Spitalfields goods), Caledonian Railway (Glasgow Central station), North Eastern Railway (Newcastle Central, Tyne Dock and Hull), Lancashire and Yorkshire Railway (Bolton and part of Liverpool-Southport route), Great Western Railway (Slough).

All-electric. Metropolitan Railway (Aldgate to Edgware Road and Baker Street to Neasden, at Baker Street with alternating current track circuit control, and the Finchley Road to Harrow widening). East London Railway (with alternating current track circuit control). Great Western Railway (Yarnton, Ledbury and intermediate signals between Pangbourne and Goring). Midland Railway (intermediate signals between Upminster and Pitsea).

SIEMENS BROS. & CO., LTD.

All-electric. Great Western Railway (Snow Hill, Birmingham, and Didcot), Midland Railway (Derby).

RAILWAY SIGNAL CO., LTD.

All-electric. London and North Western Railway (Crewe, and Euston to Chalk Farm).

SYKES INTERLOCKING RAILWAY SIGNAL CO., LTD.

All-electric (signals only). Metropolitan Railway (Praed Street to South Kensington), Glasgow and South Western Railway (St. Enoch station, Glasgow), London, Brighton and South Coast Railway (Victoria station), London and South Western Railway (Waterloo and City line), and intermediate and repeater signals at various places on many lines.

In addition there is the Spagnoletti system on the Great Northern and City ; the Hall electro-gas system between Alne and Thirsk, North Eastern Railway ; and the railway company's own installation on the Liverpool Overhead Railway, besides a few isolated installations on systems already specified or applied on particular systems in individual cases.

One could also dilate at length upon the inclusion of automatic or semi-automatic features, the use of hooded lamp signals on daylight sections, upper-quadrant arms, train stops and other characteristics of pneumatic installations, but these can be left for further attention on another occasion.

Digitized by Google

Railway Companies and Motor Road Traction.

LEYLAND MOTOR-OMNIBUS SUPPLIED TO THE LONDON AND NORTH WESTERN RAILWAY.

FOR a long period railway companies were somewhat chary of introducing motor road vehicles. There were good and sufficient reasons in most cases, and even now there are many conditions of railway collection and delivery which render horse haulage preferable to motor traction. But as a general proposition it is correct to argue that, instead of being antagonistic to railways, motor road traction can be made a handmaid to, and during the last few years there has been a notable tendency to develop it in that aspect, for the carriage of passengers, for heavy goods collection and delivery, and for light and express parcels traffic.

A study of the numbers in use on various lines according to the latest statistics available is interesting. Thus, on the passenger side there are 242 motor omnibuses, on 9 railways. The Great Western heads the list with 99, the North Eastern following with 50, and the London and North Western with 41; but in some respects the Great North of Scotland Railway's record of 35 is most interesting, seeing that a comprehensive system of feeder routes is operated thereby, almost constituting extensions of the railway system. Remaining figures are made up of 2 on the Cambrian, 6 on the Great Eastern, 2 on the London and South Western, 2 on the Midland, and 5 on the Midland Great Western. Several additions have been made recently, but no figures later than those given in the 1913 reports are yet available to enable exact up-to-date figures to be given.

These vehicles include several varieties, and may be classified as follows:—

(a) Two-decker omnibuses conveying passengers only;

(b) Two-decker omnibuses carrying passengers both outside and inside, and with luggage accommodation.

(c) Single-decker vehicles for lighter traffic, and with or without luggage accommodation.

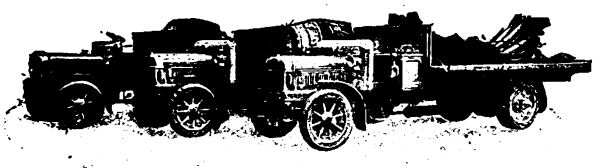
(d) Omnibuses for the conveyance of private parties, and for various duties other than what is usually termed "public service," that is, operated on advertised schedules or routes and available for whatever fare-paying passengers may present themselves.

(e) Observation cars or vehicles of the "sight-seeing and *char-a-banc* types for special and usually pleasure trips.

A majority of these vehicles use petrol engines, and accord substantially with usual motor-omnibus practice, whatever the type of body adopted, but there are, we believe, a few steamers in railway service. As far as we are aware, no electric or petrol-electric cars are included in railway companies' equipment, though some of them are found on corresponding duties in other quarters. Although railway vehicles of these types are not so numerous as one might expect, it is well to remember that large numbers of road motor services are operated privately in conjunction with the train services, and many railway time tables include particulars of a considerable variety of such services. There are, in fact, a few instances where, for convenience or other reasons, railway-owned vehicles have been transferred to private ownership, and services previously in operation are now maintained independently.

Duties given to these vehicles may be described as (1) feeder services, constituting virtually extensions of railway territory; (2) connection services, whereby a station is rendered more accessible from several places adjacent; (3) inter-connection services, affording a cross-country connection between distinct sections of a railway; (4) pleasure or sight-seeing trips organised

Digitized by Google



A GROUP OF LEYLAND PETROL LORRIES SUPPLIED TO THE GREAT CENTRAL RAILWAY.

during the holiday periods; and (5) private duties incidental to railway working.

It is somewhat curious, and supports the fact that railway goods traffic includes aspects where motor vehicles may fail to justify themselves to the same extent as in general traffic, that the total on the goods side acknowledged at the end of 1913 amounts only to 192, the Great Western with 67, the London and North Western 43, and the North Eastern 23. Other companies concerned are: Midland (18), London and South Western (16), Great North of Scotland (8), Lancashire and Yorkshire (5), North Staffordshire (3), Great Northern (3), Belfast and County Down (2), Furness (2), Great Central (1) and Wirral (1). It is known that a number of additions have since been made, so that these figures are more indicative than authoritative.

In this department duties may be classified as :—

(a) Ordinary and express parcels collection and delivery;

(b) Ordinary goods cartage, by means of lighter vehicles in replacement of horse-drawn vehicles, and including both usual services and express collection or delivery in connection with fast goods train traffic;

(c) Heavy goods cartage, by means of powerful motor vans and lorries—in some instances interchangeable bodies are used to suit varying loads and to enable a chassis to be used for one purpose while another body is being loaded or unloaded—operating with or without a trailer wagon, and

(d) Tractors—small traction engines, or corresponding hauling cars—conveying the whole of the load behind them. These are not, however, used in this country, but are found sometimes in railway service in the colonies and abroad.

For heavy vehicles steam is extensively employed, practice being derived largely from traction engine experience; but petrol engines are widely used, especially for medium loads, though also for heavy work. In the tractor division, the usual practice is to employ steam engines of traction engine type, but, as will be seen, petrol engines are also being introduced for similar duties.

In consequence of war conditions arising, a number of these vehicles, both passenger and goods, have rendered good national service, many of them having been sent to the war area. In their proper sphere, however, there is now a decided tendency to proceed much further than in the past, and when statistics for this

5-TON "KARRIER" LORRY SUPPLIED TO THE GREAT CENTRAL RAILWAY.

Digitized by Google

TWO 2-TON "KARRIER" VANS SUPPLIED BY MESSRS. CLAYTON & CO., HUDDERSFIELD, LTD., TO THE LONDON AND SOUTH WESTERN RAILWAY.

year become available there is little doubt that considerable increases upon figures stated above will have to be recorded.

In a recent issue we gave particulars of the working of motor road vehicles on the London and North Western Railway, and in other cases the methods of use involve many features of interest.

The motor omnibus is perhaps the most familiar class of vehicle, seeing that it is engaged in passenger traffic. The example illustrated is a standard class supplied by Leyland Motors, Ltd., to the London and North Western Railway. This firm have furnished the London and North Western Railway with upwards of 20 machines and have still 16 on order for delivery as soon as possible. They have also supplied a considerable number of machines to the North Eastern Railway, amounting to 13 of various types. This design seats 16 passengers inside and 18 outside. Other types include the char-a-banc design, used mainly for "observation" and pleasure trip purposes, single-deckers, private omnibuses, and light vehicles for miscellaneous purposes.

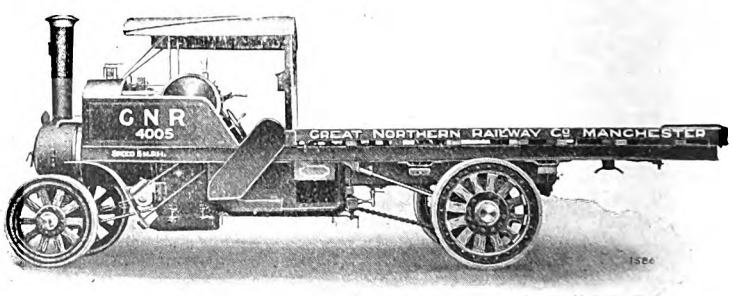
On the goods side there is greater variety A group of petrol lorries supplied by the same firm to the Great Central Railway is shown on page 471, as also a 5-ton "Karrier" lorry built by Messrs. Clayton & Co., Huddersfield, Ltd., for the same railway. The latter vehicle is of what is known as the "overtype" design, and the illustration depicts a typical West Riding load. The Great Central Railway have several vehicles of this size working in various parts of the country, particularly in Manchester and London, on station collection and delivery work.

Opposite are shown two 2-ton "Karrier" vans supplied by the latter firm to the London and South Western Railway. This railway has a fleet of 25 "Karrier" cars. The Great Central Railway also have a fleet, and the London and North Western Railway have a number of "Karrier" carrying vehicles. The London and South Western fleet comprises 1 and 2-ton vans and also 30-seated 'buses, many of their vans working in Bournemouth, others in Southampton, and a number in London.

Messrs. Clayton & Co. mention that at present the whole of their output has been taken up by H.M. War Office. The vehicles referred to are of the chain drive type, but this firm is now specialising in live-axle models for load capacities of 3 to 5 tons.

Steam vehicles are used mainly for goods transport, and many interesting examples may be seen daily at work.

A 5-ton steam motor wagon supplied by Messrs. Clayton & Shuttleworth, Ltd., to the Great Northern Railway is illustrated. Clayton steam motor wagons are constructed in standard sizes of 3, 4 and 5 tons carrying capacity in the bodies. A special wagon is built for Colonial service to carry 6 to 7 tons



5-TON CLAYTON STEAM MOTOR WAGON SUPPLIED TO THE GREAT NORTHERN RAILWAY.

Digitized by Google

Digitized by Google

FODEN STEAM WAGON: BELFAST AND COUNTY DOWN RAILWAY.

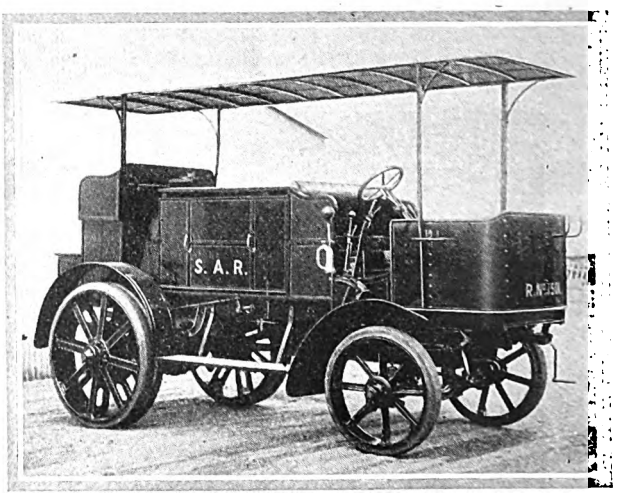
in this manner. The 3-ton type is usually fitted with rubber tyred wheels and will carry its load at the limit of speed allowed by law (12 miles per hour), though it can also be provided with steel tyred wheels, when its legal speed is 8 miles per hour. The 5-ton type can be fitted alternatively with either steel or resilient wood wheels, with steel tyres, and with such wheels the wagon is capable of carrying 5 tons on the body and hauling 3 tons in a trailer wagon at a speed of 5 miles per hour. If fitted with rubber tyres, this speed can be increased to 8 miles per hour if no trailer is attached. Any type of body can be fitted by arrangement to meet the individual requirements of the customer.

This firm, as do others building similar vehicles, also construct tractors for hauling road wagons, but these are seldom met with in railway service.

Foden steam wagons, supplied by Messrs. Fodens, Ltd., of Sandbach, are extensively employed, and the series of illustrations on page 473 and above will be interesting, various types supplied to the London and North Western, North British, Great North of Scotland and Belfast and Northern Counties Railways being shown.

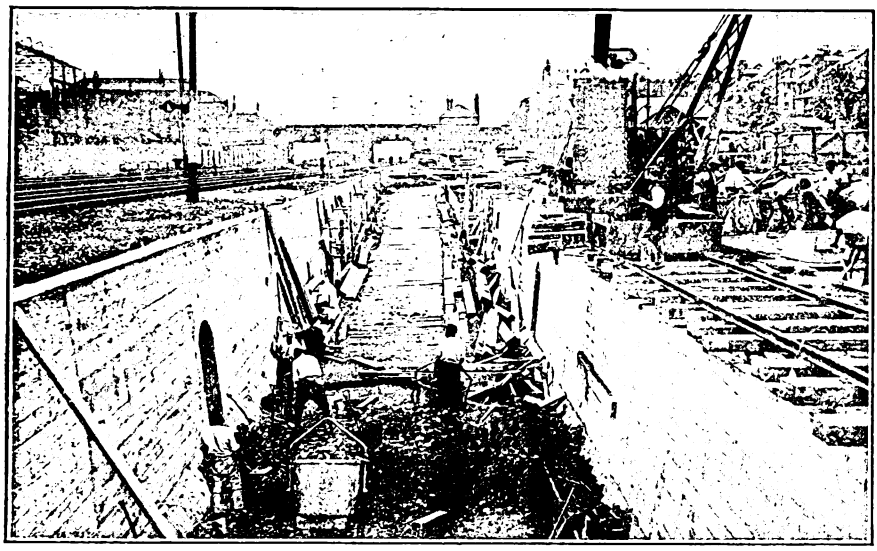
Finally, reference may be made to a new development, consisting of a tractor specially designed by Messrs. Dennis Bros. (1913) Limited, of Onslow Works, Guildford, for the South African Government Railways. These railways employ a considerable number of Dennis vehicles for passenger and light goods work, but this tractor is the first of its kind to be constructed, and is specially designed in accordance with the instructions of Mr. W. W. Hoy, the General Manager of the South African Railways.

The tractor will draw 9 tons at a speed of 12 miles per hour over reasonably good roads. It has a big ground clearance, making it very suitable for work over rough or sandy tracks, and the mechanism is very completely protected against driving sand. The engine is of 30 h.p., and is provided with a paraffin carburetter and Solex radiator. The transmission is rather unusual. The engine is placed near the rear of the chassis, and a long shaft runs forward from the clutch to an aluminium casing over the front axle. Thence, the drive is by silent chain to a lower shaft which enters the gear box, the final drive from the gear box to the large back wheels being through Dennis worm gear. The tractor has a ground clearance of 14 in.



DENNIS TRACTOR BUILT FOR THE SOUTH AFRICAN GOVERNMENT RAILWAYS.

Digitized by Google



INCLINE TO SURFACE AT QUEENS PARK.

Extension of the "Bakerloo" Railway to Queens Park.

AN IMPORTANT UNDERGROUND DEVELOPMENT.

FOREMOST among the many schemes of development and improvement materialising throughout the Underground system is the extension of the "Bakerloo" section of the London Electric Railway to Queens Park, which is now nearing completion, and will, it is expected, be opened for traffic before the close of the present year. At Queens Park a junction is effected with the London and North Western Railway, so that the "Bakerloo" line, which is the oldest of the three lines comprising the London Electric Railway, thus becomes the first tubular railway of the Metropolis to be physically connected with a main line. The importance of this development and the influence it is bound to exercise upon traffic between central London and the rapidly growing suburbs of the outer radius on the north-west are obvious.

The work of constructing the new line, which has a length of exactly two miles, was commenced in October, 1912. From the existing terminus of the "Bakerloo" line at Paddington the extension passes through the populous residential district lying on the west of the Edgware Road to the Queens Park station of the London and North Western Railway, connecting thereat with the newly-constructed line of that company to Watford. No unusual engineering difficulties were encountered during the task of boring the tunnels of the Underground extension, which run through London clay for the whole of their course.

There are three stations on the new line, the first being situated beneath the broad roadway facing St. Saviour's Church in Warwick Avenue, after which thoroughfare it will be named; the second, to be called Maida Vale, is at the junction of Portsdown Road with Elgin Avenue, about a hundred yards off the Edgware Road; while the third, which will be known as Kilburn Park, is in Cambridge Avenue, near the Kilburn station of the London and North Western Railway.

All three of the new stations will embody the latest features of Underground station design, in general details following closely the lines of the "Bakerloo" station at Paddington. At Warwick Avenue there will be no superstructure, short flights of stairs leading down from the pavements to a spacious booking hall below the roadway, the street entrances being enclosed by glazed brick canopies surmounted with the familiar

Digitized by Google

sign of the Underground. At Maida Vale and Kilburn Park the booking halls will be on the street level. Lifts will be entirely dispensed with, escalators providing the means of communication between the booking halls and the platforms below. Each set of escalators will work on either side of a stationary staircase, and the lower landing being within a few feet of the platforms, passengers will be able to make the journey between the latter and the street with the utmost facility and convenience. Each moving stairway will travel at a speed of 90 ft. per minute and be capable of transporting about twelve thousand people hourly. The escalators which normally descend are reversible, and could be adapted for ascent in the event of a derangement to the ascending escalator, an arrangement in conjunction with the existence of the stationary stairway, providing effectually against the contingency of a temporary stoppage of either of the escalators. At Warwick Avenue the escalators have a vertical rise of 34 ft. $10\frac{3}{4}$ in., at Maida Vale one of 37 ft. 9 in., and at Kilburn Park of 34 ft. 3 in., figures affording a fair indication of the depths of the stations below the street levels.

Between Kilburn Park and Queens Park the new line emerges from the tunnel, and, for the last quarter of a mile of its course, runs in the open alongside the London and North Western Railway, with which it finally connects. At Queens Park the "Bakerloo" trains will share an island platform with the trains of the North Western Company, so that the means of transfer from one line to the other are of the simplest character. Electrical energy for the Underground extension will be supplied from a new sub-station adjoining Kilburn Park station, and two new car sheds for the accommodation of the "Bakerloo" rolling stock have been erected at Queens Park. Altogether the extension will have entailed an expenditure on the part of the London Electric Railway Company of over three-quarters of a million pounds.

By the courtesy of Mr. Z. E. Knapp, Chief Engineer to the Underground Electric Railways Company, Ltd., and Mr. H. H. Dalrymple-Hay, Consulting Engineer, who is responsible for the construction of the new line, as for most of the tube railways of London, together with other officers of the associated railways, we have been privileged to inspect the new works in their present condition.

Beyond Paddington station the tubes already extended some distance for reversing and stabling trains, and from this point to the cut and cover way, whereby the surface is reached at Queens Park, is in tube, involving usual characteristics of construction. The tubes have been driven by the shield method, as elaborated by Mr. Dalrymple-Hay, and with a special system of building shield chambers to meet certain conditions existing at three or four places, but otherwise construction has been entirely straightforward, not entailing the use of compressed air, and without water difficulties. The standard diameter of the running tubes is 11 ft. $8\frac{1}{4}$ in., increased to 12 ft. on curves, and of 21 ft. $2\frac{1}{2}$ in. for the station tubes, constructed by means of shields. Four working shafts were used, one adjacent to the Harrow Road for the commencing section, and the others respectively at Warwick Avenue, Maida Vale (Elgin Avenue), and Kilburn Park (Cambridge Avenue) stations.

The steepest grade is 1 in 30, as usual on the departure sides of stations for assisting acceleration, with 1 in 60 for approaching retarding inclines, but to reach the surface at Queens Park the gradient is for some considerable distance 1 in 48. The sharpest curve is of 10 chains radius. Throughout the route the two tubes are side by side, and parallel except as entailed by variations of grade approaching and leaving stations according to the direction of traffic, and the widening out at stations. The track is constructed in the usual solid fashion now found on all the modern tubes, with slag wool packing to assist in deadening noise and vibration. Signalling will be automatic and semi-automatic, on the McKenzie, Holland and Westinghouse Power Signal Company's electro-pneumatic system, to accord with that already in use on the "Bakerloo" line.

Beyond Kilburn Park the tubes first curve round to pass diagonally under the London and North Western main line, which is here of considerable width, owing to the existence of a coal yard on one side and sidings on the other, besides the four standard running lines. From the tube ends there is a section constructed by the cut-and-cover method, the two lines being open to one another and roofed over by girders. Leaving the curved portion, the lines rise between concrete retaining walls to the surface, and so reach new platforms which are being provided at Queens Park.

Digitized by Google

One of the London and North Western lines will, in due course, be the down electric line from Euston and Broad Street, while on the other side of the descending grade will be one of the car sheds (" A ") and the up London and North Western Railway electric line.

The new tracks, therefore, rise between what will be the up and down electric lines used by Euston and Broad Street stations, and the station is being built on that principle. To reach the new portion—the whole of the station is being reconstructed and newly laid out, but as regards electric traffic it will consist of two islands, one for down and one for up London and North Western Electric traffic, with the London Electric tracks innermost, and therefore between the two platforms—new arches had to be made in the bridge carrying Salusbury Road across the line.

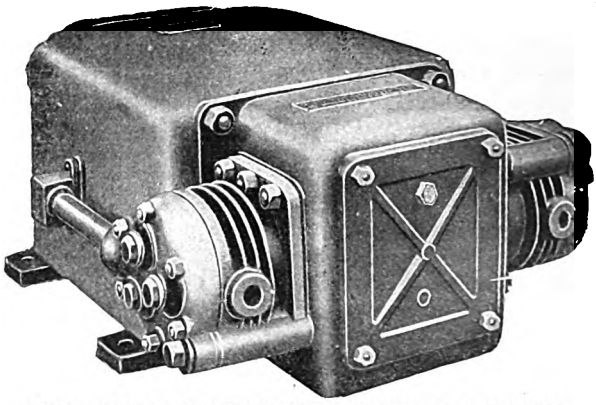
Along the up side of the descending grade and over the cut-and-cover section a long two-track car shed (for thirty cars and 758 ft. long) is being built, the up London and North Western Railway electric line passing outside this. This car shed (" A ") will have pits between both lines for examination purposes. Car shed " B " is located beyond the station, and involves a somewhat curious arrangement. It is 355 ft. long, with four tracks constructed in direct extension of the London Electric lines through the station; but for trains proceeding beyond Queens Park the respective outer lines will be the through running lines, though passing within the shed. The building is being erected with a two-bay road in the centre and two single-road bays on either side. The centre roads are actually the shed roads, and have inspection pits, and beyond they are continued for a further 168 ft. covered in, but open at the sides. By passing the running lines beneath the shelter of the car shed, it follows that they can be used for stabling trains under cover between the last and first trains, or pending the inauguration of through working. Beyond the shed they connect with the respective London and North Western Railway electric lines. Sheds " A " and " B " are both constructed on fireproof principles.

The " Bakerloo " Railway, from its southern terminus at the Elephant and Castle to its new northern extremity, is now about seven miles in length, while the distance from the former point to Watford is 20¾ miles. Owing to the station at Maida Vale not being in such an advanced stage of construction as are the others on the new line, the former will not be used for traffic until a later date, so that on the inauguration of the extended service the " Bakerloo " trains will run direct from Warwick Avenue to Kilburn Park. A two-minutes' service will be maintained over the " Bakerloo " line during the busy periods of the day, while four trains hourly will eventually run through to Watford, the journey being accomplished in about 60 min. In addition to the through trains to Watford from South London, there will, of course, be all the advantages of the connection at Queens Park with the fast Watford services of the London and North Western Railway.

The " Bakerloo " extension links up the Underground system with a district which has, thus far, been somewhat deficient in direct railway communication with central London and the south-east, while the physical connection with the London and North Western Railway, in addition to the many other important interchange facilities engendered thereby, will bring the Watford region of Hertfordshire within easy access of the shopping districts and the pleasure resorts of the West End, and, through the " Bakerloo " Railway's connections with the other lines of the Underground, link up every part of the Metropolis with the rapidly developing residential districts of Greater London on the north-west. From Watford to Piccadilly Circus will be a journey of about 52 min., to Edgware Road one of 44 min.

Digitized by Google

Air Compressors in Railway Service.



WESTINGHOUSE ELECTRICALLY-DRIVEN AIR COMPRESSOR FOR INTERMITTENT RUNNING.

IT probably hardly ever occurs to the thousands of travellers on trains fitted with compressed air brakes how much their safety depends upon the proper working of the air compressor. Failure of the air supply would render the brakes inoperative, and, therefore, this small but important adjunct to the locomotive must be very carefully constructed in order that its operation may be entirely reliable. At every application of the brakes on the train a certain depletion of the compressed air in the reservoirs takes place, and this the compressor must be instantly ready to restore.

The efficiency of the brake apparatus is, in fact, a far-reaching factor in railway operation; and it is well to remember that it supplies the main reason why high-speed trains and intense traffic can be worked at all, the means for controlling and stopping a train being even more important in some respects than the capabilities of the locomotive engine. The Westinghouse brake was, indeed, responsible for the development of high speed traffic as a practicable proposition, that is, as a standard method of conducting transportation, as distinct from the mere fact that on a clear road a light train could maintain a high average speed over a specified distance, as was often done in the days of infrequent trains on the Bristol and Exeter, Great Western and other lines before power-brakes were used at all.

Other systems of braking and controlling trains are now in use, especially the vacuum, but it is well to emphasise the fact that the Westinghouse equipment paved the way for modern conditions, and is still very largely used here and almost exclusively in other countries.

In modern train service, other demands are often made upon the compressed air, such as to operate sanders, water supply to lavatories, etc., etc., all of which place a heavy and increasing strain upon the air compressor.

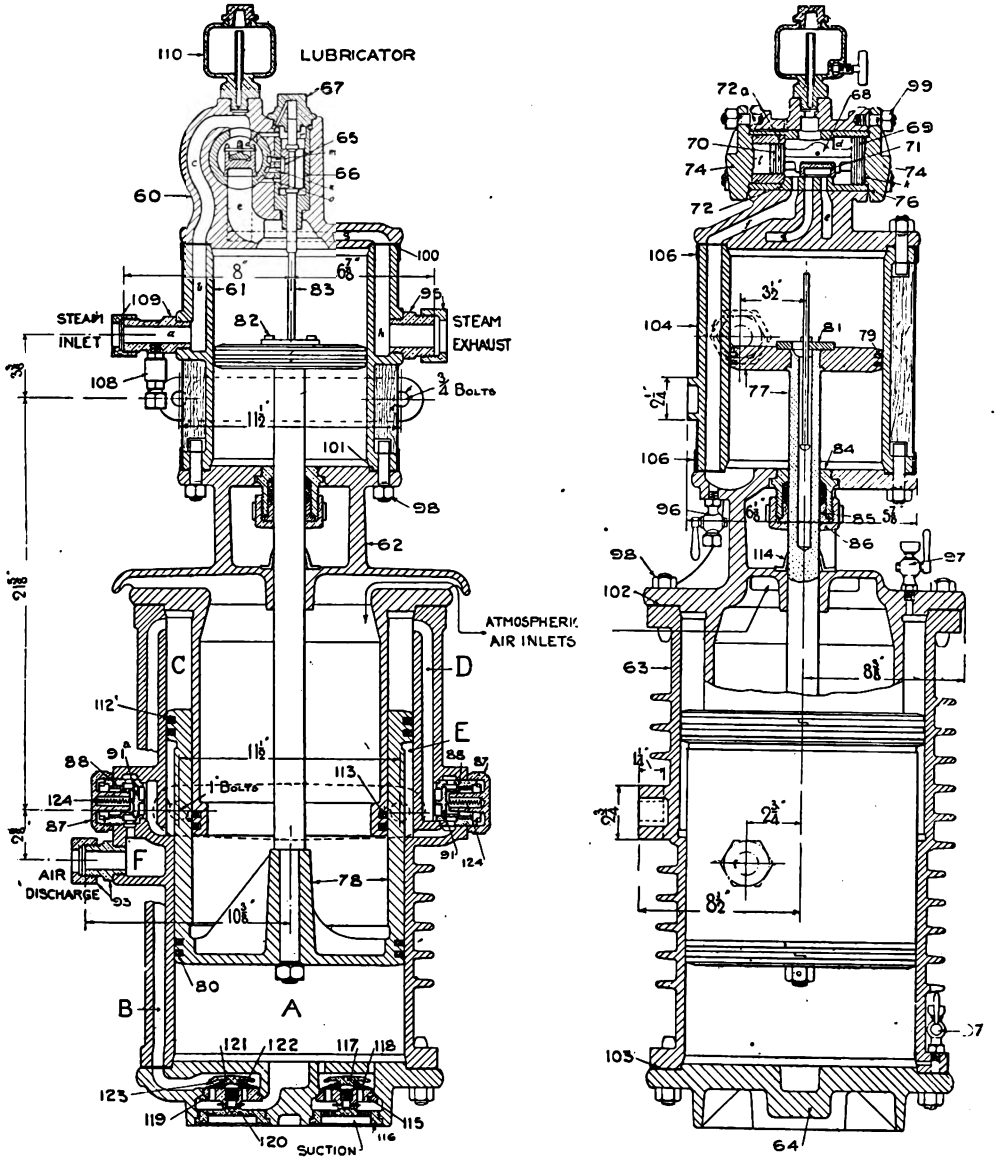
The Westinghouse steam-driven air compressor, which has set the standard for railway service for upwards of 40 years, and of which many thousands are in daily use throughout the world, is notable for its compact and reliable construction. It is built to work vertically and occupies very little space. On British railways it is generally located on the right hand side of the locomotive and is carried on a suitable bracket. Its position, however, is immaterial, and in some countries it is placed on the left hand side of the engine.

The standard air compressor consists of an air cylinder below, which is connected to the steam cylinder above by a centre piece, through which the rod connecting the steam and air pistons passes. All the working parts are located in what is known as the "tophead," and are readily accessible for inspection and repair. In the case of a serious breakdown, the tophead can be removed bodily and replaced by another in a very few minutes, so that the compressor need never remain long out of commission if a spare tophead is available. The air valves are contained in separate cases, so placed that the valves can be easily removed for inspection or repair; the air valves of each size of pump being all of the same type and size. The standard Westinghouse compressor is built in upwards of 30 different combinations of steam and air cylinders, enabling it to meet practically any conditions of service which may arise.

For producing air at high pressures without increasing the consumption of steam, the Westinghouse Brake Company, Ltd., have applied the principle of their simple air-

Digitized by Google

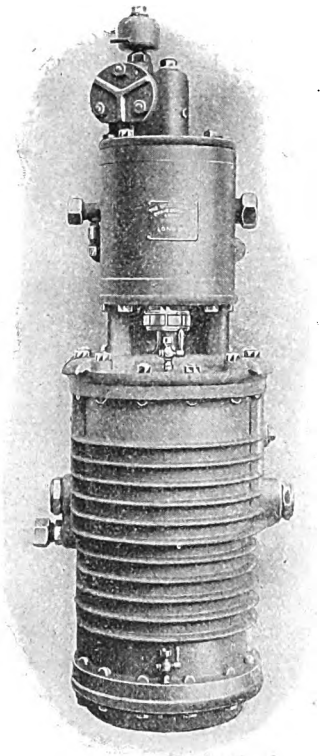
compressors to various compound types. In these, the standard steam cylinder with its detachable tophead is retained, and is connected vertically to high and low pressure air cylinders. To meet the ever-growing demands upon the compressed air stored in the main reservoirs of the locomotive, the use of such compound air compressors is increasing on many railways. Owing to the air current set up when travelling, the heat generated during such high compression, which would otherwise be of considerable disadvantage, is largely dispersed, but for stationary work, as for instance when installed in the shop for supplying air to tools, etc., it is generally necessary to surround the air cylinders with water cooling jackets.



WESTINGHOUSE THREE-STAGE COMPOUND AIR COMPRESSOR.

The Westinghouse Brake Co., Ltd., have, however, devised a novel form of compound air compressor, in which provision is made

Digitized by Google



WESTINGHOUSE THREE-STAGE COMPOUND AIR COMPRESSOR.

for the free circulation of atmospheric air around the inner walls of the air cylinder. As will be seen from the sectional view of this compressor, the centre-piece 62 projects half-way into the air cylinder, and the hollow trunk air piston slides in the space between it and the cylinder wall. Inhalation takes place only through the suction valve in the bottom cover, and the compression is in three stages in chambers "A," "C" and "E" successively. At every downstroke of the air piston, however, during which the final stage of compression takes place, atmospheric air is drawn into the interior of the air cylinder, to be again expelled as the air piston rises. Thus there is a constant circulation of cool air inside the air cylinder, which disperses much of the heat of compression, the temperature of the air delivered varying from 168° to 266° Fah., according to the density of the compression. This pump, therefore, forms a very valuable adjunct to machine shop equipment. It is designed for working pressures up to 300 lbs. per sq. in.; occupies an area of only 17 in. by 22 in.; can be bolted to a wall or column; and if fitted with an automatic governor, will work continuously without attention beyond periodical replenishment of the lubricators.

The use of electricity for traction purposes introduced a new problem into the provision of compressed air for braking purposes. Silent working is essential, as the compressor is slung below the floor of the coach; the pump cannot be run beyond a certain speed for efficient working; the entry of foreign particles into the crank case must be guarded against; and the passage of oil from the crank case by vaporisation, or otherwise, into the brake system must be prevented.

The Westinghouse rectangular motor-driven air compressor shown on page 478 meets these conditions very fully. It is compactly designed; its parts are readily accessible and of ample wearing surface; the valves are constructed to give a free intake at every stroke of the piston; and the pistons are so arranged as to prevent any oil being forced into the delivery pipe or reservoir. Finally, it is direct-driven by a special slow-speed motor, which ensures very quiet working and a high sustained efficiency as compared with air compressors driven by standard high-speed motors through ordinary spur gearing. However carefully they may be adjusted, gears wear in course of time; the efficiency of the pump decreases as the wear increases; and the action of the compressor is brought daily more unpleasantly to the notice of the passengers in the coach. These disadvantages should more than offset the somewhat higher initial cost of the direct-driven compressor, due to the heavier winding of the slow-speed motor, but to meet the demand for a less expensive compressor, the Westinghouse Brake Company, Ltd., expects shortly to market a compressor which will embody all the advantages of the pump first described, while using an ordinary high-speed motor for its propulsion.

Digitized by Google

Railway Engineering and Equipment.

Route Signalling at St. Pancras Station.

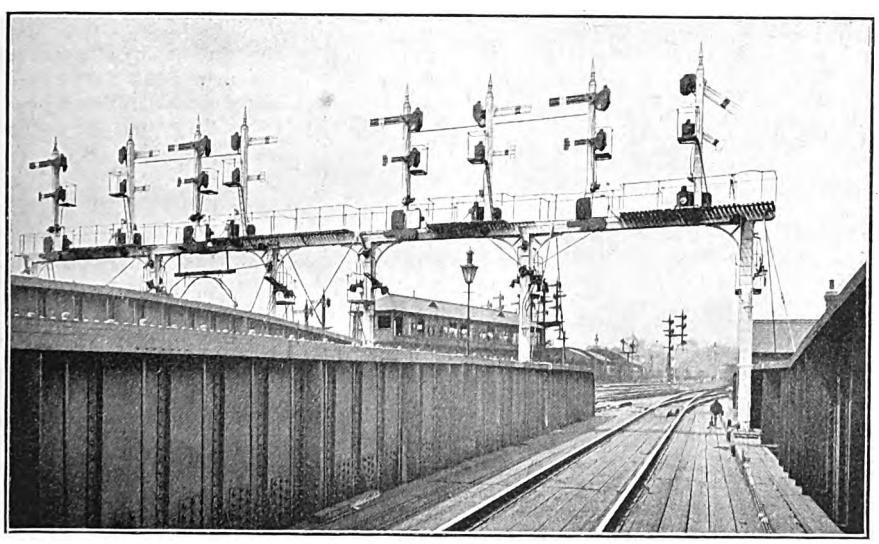
ROUTE-INDICATING signals in place of multiple arms are gradually being adopted on various lines, and an interesting equipment has been completed by Mr. W. C. Acfield, Signal Superintendent, Midland Railway, at St. Pancras station. The gantry which spans the bridge over Pancras Road previously had forty-two arms, but sixteen are now sufficient.

Beyond the platforms all lines connect with four roads—west departure road, east departure road, west arrival line, and east arrival line. There are eight dolls instead of twenty-one, one inwards and one outwards for each of the four lines concerned, and each doll has merely a main arm, a shunting arm and an indicator at the base. These indicators consist of a lamp casing with opal glass front, and numerals or letters cut from sheet metal are caused to move transversely as required from a casing at one side to a position before the lamp casing. By day the figures show prominently against the white ground; by night they appear dark against an illuminated ground. Letters and numerals are shaped according to a system devised some time ago, whereby any chance of mistaking one figure or numeral for another is minimised.

The first covers departures *viâ* the west departure road to east or west departure line or to goods; the next controls arrivals *viâ* east departure line to platforms 1 and 2; the third governs departures *viâ* east departure road to east or west departure lines and to goods; the fourth applies to arrivals *viâ* west departure line to platforms 2, 3 and 4; No. 5 allows of departures *viâ* west arrival line to east or west departure lines, or to goods or up lines; the next controls arrivals to platforms 5, 6, and 7; the seventh governs exit to the up line only; and the last applies to arrivals at platforms 6 and 7. There are thus four letters required for outwards movements—E, W, G and U—and figures 1, 2, 3, 4, 5, 6 and 7 for inwards traffic.

Rearrangement of levers in the signal cabin has resulted in the economy of several levers, but this is mainly incidental. The signalman, after setting his route, moves the appropriate lever to set the indicator—this is controlled by the interlocking—and then lowers the main or shunting arm as required, this being impossible until the indicator is set.

The indicators are carried by horizontal slides supported on anti-friction travelling rollers running in slots or grooves in cheeks or diaphragm plates which form the supports and guides



NEW SIGNAL GANTRY AT ST. PANCRAS STATION, MIDLAND RAILWAY, FITTED WITH ROUTE INDICATORS. SIXTEEN ARMS REPLACE FORTY-TWO AS ORIGINALLY EMPLOYED.

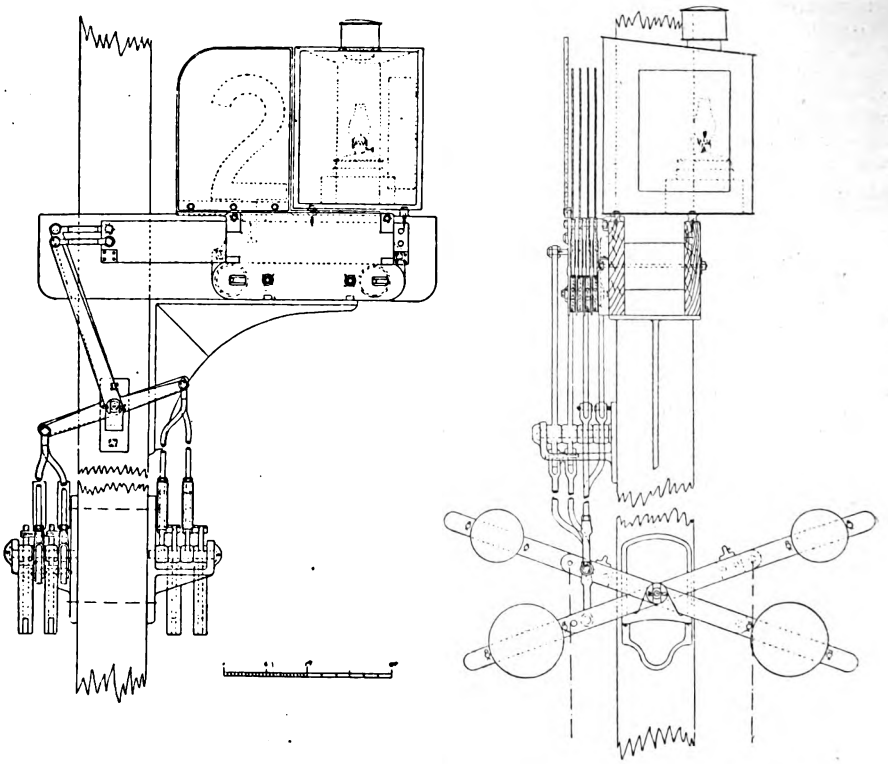
Digitized by Google

of each slide. These rollers are so designed by co-ordinating the circumference and the travel of the trunnions in the slotted guides that there is a free rolling movement, rendering lubrication and attention almost unnecessary. The trunnions and the guide plates are also so designed to fit together as to realise compactness, while, in combination with bearing plates attached to the slides, good vertical support is given, without other and special guiding means.

The letters or numerals are cut out in profile, and in their normal or blind positions are stowed behind a screen. In order that there shall be no shock or jarring when a letter or numeral is exhibited, the slides are connected by means of rods or wires to what are known as "drop-off" levers similar to those used for controlling signals on railways. The drop-off lever with its weight is held in its normal position by a counterbalance lever and weight fixed in the usual manner on a signal post, and which is connected to the operating lever in the signal-box by ordinary rods or wires. The slides are connected by rods to the drop-off levers through the long armed cranks, as shown, the mechanism being arranged on one or both sides of the post as convenient, and the bell-cranks designed accordingly.

When a counterbalance lever is operated by the signalman pulling over a lever in the signal-box, a drop-off lever with its weight is released, and by gravity operates the slide to which the required letter or numeral is attached, thus bringing the said letter or numeral out from behind the screen for exhibition. When the lever in the signal-box is replaced, the corresponding counterbalance lever overcomes the drop-off lever, and replaces the letter or numeral behind the screen.

As some of the signals are not conveniently visible from the station box, the indicator lamps are provided with back-light screens moved by the indicating slides to obscure or uncover the rear-lights as required.



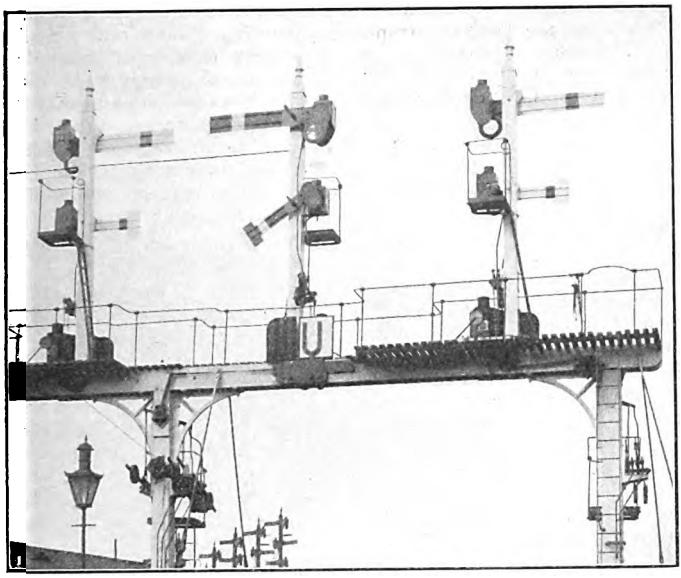
MESSRS. ACFIELD AND COOKE'S ROUTE-INDICATING SIGNAL MECHANISM AS INSTALLED AT ST. PANCRAS STATION, MIDLAND RAILWAY.

Mr. R. H. Selbie and Railway Electrification.

In his Presidential address to the Railway Students' Association at the London School of Economics, Mr. R. H. Selbie, the well-known general manager of the Metropolitan Railway, made some interesting remarks on a subject concerning which he is particularly well qualified to speak, that of electrical and steam railway costs. His chief points are set forth in the following extracts from his interesting address.

"The question so often asked by the uninitiated, 'is electric working cheaper than steam working?' is one to which it is impossible to

Digitized by Google



ROUTE INDICATING SIGNALS AT ST. PANCRAS, MIDLAND RAILWAY.

give a direct answer. Everything depends upon the surrounding conditions and circumstances. If a concrete case be taken of a line on which there is a steam service of, say, ten trains per hour, and the question be asked whether those ten trains could be run as cheaply by electricity with the high acceleration usually adopted in electrical working, the answer would undoubtedly be in the negative. The cost of providing a plant for the supply and distribution of electrical energy, of equipping the trains with motors, and the line with the necessary conductor rails or wires would not be justified under such circumstances. If, on the other hand, we take the case of a line that has already reached its maximum capacity in steam working during, at any rate, the rush hours of the day, and where the traffic demands a still further number of trains, I have no hesitation in saying that, taking all the circumstances into consideration, an adequate electrical service could be provided on such a line at a lower price than by steam power. It must not be assumed from this statement that the actual working cost per train mile would be less under electrical conditions, but rather that the further expenditure required to enable any considerable increase to be made in the steam service would be such as to more than counterbalance the greater cost of electrical haulage."

Advantages of Electrification.

"BEFORE dealing with the question of the actual cost of operation under the two methods of working," continued Mr. Selbie, "let us see exactly what the advantages are that are claimed for the electrical system, and how they overcome the difficulties just referred to.

(1) By the use of electric trains on the multiple-unit principle, *i.e.*, with motors and driving apparatus at each end, the shunting of engines is obviated, and the occupation of platform roads is reduced by one half.

(2) In the case of motor-operated trains, the power can be so applied and the gearing so arranged as to render a much quicker acceleration of the trains possible. Experience proves that an electric train will attain a speed of 30 miles per hour in twenty-nine seconds from the time of starting, while it takes a steam train of the same weight ninety-seven seconds to attain the same speed. In general, the average increase in speed in an electric train during accelerating periods may be taken to be about 1·02 miles per hour in every second, whilst that of a steam train is about ·31 mile per hour in every second. Another important result following from increased acceleration is the possibility of shortening the signalling sections and of installing a system of automatic signalling. The capacity of the line and consequently its earning power are in these ways greatly increased.

(3) A third advantage that the electrically-worked train has over the steam train lies in its greater flexibility, or, in other words, in the readiness with which its composition can be adapted to the varying needs of the traffic.

"To turn now to the cost of working under the two systems Under electrical conditions the expenses may be divided under two heads :—

(1) The cost of current.

(2) The cost of providing, maintaining, and manning the train.

"The first heading includes (1) Interest on the capital cost of the generating station, sub-stations, and machinery, together with their maintenance and depreciation ; (2) the cost of the staff employed, and the coal, stores, etc., consumed in the electrical stations ; (3) interest on the cost of the conductor rails, cables, ducts, etc., together with the cost of their maintenance and depreciation. The total of these items spread over the number of units of current generated gives the cost per unit of the current as delivered upon the rail. In the case of a modern and economically worked plant with an output of, say, over 50,000,000 units per annum, the cost on the basis named will be found to amount to about ½d. per unit. The total output of electric current in units may be then taken and spread over the total number of train miles run. The result varies on different systems according to the weight of the cars employed, the gradients to be overcome, and other considerations, but an average consumption of

Digitized by Google

current by a six-car train of about 200 tons weight (including passengers) may be taken at 18 Board of Trade units per mile, or, in other words, the electric motive power required to propel such a train for 1 mile and provide for its lighting and heating is 18 units, or in cost at the rate of .5d. per unit—9d.

"Under train expenses we must include: (1) Interest on the cost of the train, its electrical equipment, wiring, etc., together with their maintenance and depreciation; (2) the wages of the motormen and guards, and cost of oil, lighting, etc. The total cost of these items may be taken and spread over the total number of miles run, and it will be found to work out at about 2¼d. per car mile, or 13.5d. per train mile of six cars.

The total cost may then be stated as under:

	Per train mile.
Motive power for current	9.0d.
Provision and staffing of train .	13.5d.
	22.5d.

These figure do not represent the actual cost on any particular system. They may, however, be regarded as fair average figures based upon the experience of several lines upon which electric motive power is used."

Cost of Working Electric Traction.

"THE cost of working a steam train of similar seating capacity may be taken as amounting to about 17d. per train mile, or about 5½d. per train mile less than an electric train. But it has to be borne in mind that while under steam conditions the maximum number of trains is limited for reasons already given, and is in no case likely to exceed fifteen trains per hour into a terminus, it is possible under electric working, as previously described, to take as many as thirty trains per hour into a terminal station, or even forty or forty-five trains over the same pair of rails when not confined to one terminus.

"There are also other features of the case that must not be lost sight of. In the first place, there is the question of the length and seating capacity of the trains. A train of six cars weighing about 200 tons loaded, is about 320 ft. long, and has a carrying capacity of 400 passengers. This has been found in practice to constitute a convenient and economically-worked train unit, and one that is readily divided to meet the smaller demands of the mid-day traffic. By the adoption of electric traction the number of trains can be doubled, and their capacity reduced by, say, 25 per cent., and still leave a very substantial margin of increased seating accommodation.

"The question of the load factor at the power house is also one of first importance. The load factor may be defined as the ratio of the work done in kilowatt hours to the possible work. It is an axiom that the higher the load factor the more economically can the plant be operated. A railway company owning its own generating plant has various uses to which it can put its surplus output of current during the middle hours of the day, when the call upon it for traction purposes is low. It can employ it for driving capstans, operating cranes, and for all purposes for which power is required in its goods yards and warehouses in the vicinity of the electrified portion of its line, and in addition for operating all tools, lifting appliances, etc., in its locomotive and carriage shops. By these means a great deal may be done towards equalising the consumption throughout the day, and so raising the load factor at the power house."

In conclusion Mr. Selbie expressed the opinion that there is hardly any case of a suburban line running out of London that would not repay the cost of electrification. Each instance has its own peculiar difficulties, but they are not such as need be regarded as insuperable. The long-distance traffic on our main lines is handled to-day in a way that leaves little to be desired, and if the same spirit of enterprise that has brought those services to their present state were to be applied to the problem of the short distance and suburban traffic, the result could not fail to be to the advantage both of the public and the companies themselves.

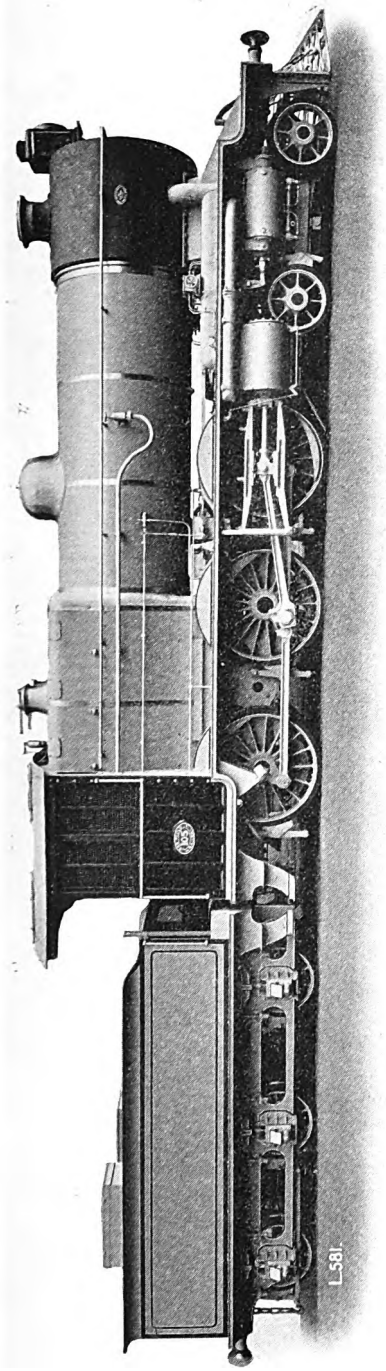
Four-Cylinder 4-6-0 Locomotives: San Paulo Railway.

THE North British Locomotive Co., Ltd., have just completed a series of 4–6–0 four-cylinder express locomotives for the San Paulo (5 ft. 3 in. gauge) Railway of Brazil, and one of these is here illustrated. All four cylinders use high-pressure steam, those inside actuating the leading coupled axle, while the outside cylinders drive the middle pair of coupled wheels. For the inside cylinders the piston valves are placed outside the frames between the bogie wheels, actuated through rocking shaft transmission gear, while the piston valves for the outside cylinders are above them, the two steam chests on each side being connected. Valve gear is of the Stephenson type, carried by the leading coupled axle, two sets only being employed, both piston valves being operated from the same rocking shaft. The boiler is of large size, and is fitted with "Robinson" superheater. A Weir feed-pump is provided, in addition to a Korting injector, a Dreadnought ejector and Hasler speed indicator and recorder. The double safety valves are of Continental type. The design was prepared by Mr. C. R. Hillman, locomotive superintendent of the San Paulo Railway.

Leading dimensions are:—

Cylinders	17 in. by 26 in.
Wheels—Coupled	5 ft. 6 in. dia.
,, Bogie	3 ft. 0 in. dia.
Wheelbase—Rigid	14 ft. 0 in.
,, Total	28 ft. 0 in.
Working pressure	175 lb. per sq. in.
Heating surface—Tubes ..	1,651 sq. ft.
,, Firebox ..	185 ,,
,, Total ..	1,836 ,,
,, Superheater	535 ,,
,, Total ..	2,371 ,,

Digitized by Google



FOUR-CYLINDER 4–6–0 SUPERHEATER LOCOMOTIVE: SAN PAULO RAILWAY (BRAZIL).
Built by the North British Locomotive Co., Ltd.

Fire-grate area	.. ..	34·6 sq. ft.
Weight—In working order	..	78 tons 14 cwt.
,, On coupled wheels		55 tons 9 cwt.
Weight of tender, full	..	37 tons 16 cwt.

Automatic Ticket Machines.

A year ago the practice of controlling access for non-passengers to platforms of stations by means of platform tickets was still somewhat exceptional, but now a large number of the big stations are operated in this way, the platforms being closed to other than fare or platform ticket holders. A considerable proportion of the platform ticket-issuing machines now in use, have been supplied by the British Automatic Co., Ltd., whose apparatus has been well-known for years past for the coin-freed sale of sweetmeats, matches, etc. The mechanism employed is of a simple but well-tried character, and it is but seldom that any of these machines fail, even in a minor degree. They are of compact design, and as usually located in a convenient position close to the platform gates, offer no obstruction to circulating traffic.

We have already described these machines, also the corresponding designs for issuing travel tickets for penny and twopenny and similar fares in large request. They have, indeed, largely solved the problem of supplying a rush of passengers quickly with small-fare tickets of a standard character. In fact, without them it would be exceeding difficult to deal with the crowds of passengers at many stations during busy hours at any rate, unless having additional booking windows open and more clerks on duty.

The use of such machines is capable of considerable extension, and the following classification will be of interest:

(1) Platform ticket machines.

(2) Penny-fare ticket machines.

(3) Twopenny and threepenny machines, released by two or more coins separately inserted.

Modes of use:

(*a*) At large stations for non-travellers.

(*b*) At busy stations for tickets in considerable demand. (This includes tickets available beyond any specified stations, sometimes in alternative directions).

(*c*) To issue workmen's standard fare tickets.

(*d*) At "halts" where no staff is kept, for issuing tickets to an interchange or booking station.

British Made Time Recorders.

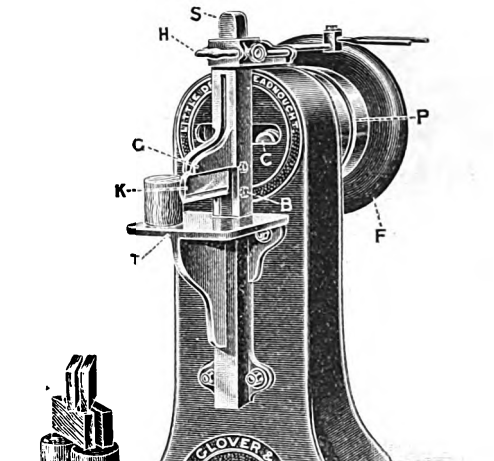
"British Manufacture" has a significance beyond patriotism; especially is this so in so important an instrument as an employés' time recording machine. There may be an absence of outside show and finish, but the solidity and accuracy are both evident. The National Time

Digitized by Google

Recorder Company, whose works are at 5, Blackfriars Road, London, are well-known as makers of all-British time recorders which have withstood the test of years in hundreds of factories. There are few purchasers of time recorders who are sufficiently versed in the cardinal points essentially necessary in a perfect time recording machine, but a visit to the showroom of the National Company will at once convince intending purchasers of the advance that has been made over the foreign made machine both in strength and simplicity of mechanical action. A most important improvement is the patent check action. This clever device avoids the mistakes of work-people registering their time for days other than the correct one or for any day in advance. Every machine is automatic and merely requires winding once a week. It produces a fully tabulated time card, which forms the wages bill for the complete week, pointing out to the wages clerk the number of times each man has been late or made overtime. Another advantage of these recorders is that any number may register on the same machine. The same machines are used very extensively for costing, in which the National Company specialise, and will freely give information on this subject.

Railway Waste Timber.

M. Glover & Co., patentees and saw mill engineers, Leeds, have brought out a compact powerful, and efficient little machine at a very low price, which should prove a great boon to railway companies for reducing wood for lighting locomotive fires, and to every manufacturer of firewood bundles or fire lighters. It has been named "1914 Little Dreadnought"; as it dreads nothing in the way of knots or cross-grained wood, and works with astonishing precision and rapidity on boards or heavy sleeper and pit prop blocks. Glover's Patent Rotary Firewood Splitting Machine for small waste pieces and boards has met with much success, but many users require to split heavier classes of wood, consequently Messrs. Glover designed this smaller machine which allows of the wood being manipulated just as the worker would wish to manipulate it whilst chopping by hand, so every objection is fully met, and the output of the machine is extraordinary, even when worked by a mere boy.



As will be seen by illustration, the machine consists of a substantial box casting or frame, constructed purposely to cover and conceal the working parts almost entirely, which protects both them and the workers. Special care has been taken to introduce a long connecting rod, "C," working downwards "in compression" in conjunction with a substantial "knife carrying slide," "S." The knife, "K," is most securely grasped and bolted at "B," all with a view to securing that solidity of blow which is a most important feature in all "Glover's Type" machines. The bearings in which the substantial top shaft works are longer than would appear in the illustration, as, in order to secure this, we may explain that the bearing extends underneath the loose pulley and right up to the fly wheel, "F," and the loose pulley, "P," does not revolve on the shaft at all, as ordinarily might be expected. Above the knife is fitted a suitable guard, "G," and it is considered that there is much less danger with this machine than with chopping with an ordinary hatchet, as the knife does not come to the table, "T," but would allow the whole hand to pass underneath without touching.

Messrs. Glover are prepared to take back this machine any time within twelve months at full price in exchange for a larger automatic machine, should such afterwards be desired.

Digitized by Google

PERTINENT PARAGRAPHS

Our Colour Plate.

THE frontispiece to this number of the RAILWAY MAGAZINE depicts one of the British-built 4–4–0 superheater locomotives supplied by Messrs. Beyer, Peacock & Co., Ltd., to the South Eastern and Chatham Railway, to the designs of Mr. R. E. L. Maunsell, Chief Mechanical Engineer. These engines are *not* provided with brass domes and copper-capped chimneys, as suggested recently by a contemporary, and as now shown the appearance of these interesting engines is correctly presented. We have to acknowledge the co-operation of Mr. Maunsell in reference to the preparation of this plate. The engines differ very slightly from those built in Germany and illustrated in the August RAILWAY MAGAZINE. The principal change is that the Robinson superheater is fitted.

* *

New L. & N.W.R. Officers.

LAST month we gave a portrait, among others, of Mr. Guy Calthrop, who has now taken up the position to which he was appointed last year of General Manager, London and North Western Railway. We also referred briefly to the appointment of Mr. L. W. Horne to be Superintendent of the Line, in succession to Sir Robert Turnbull, and of Mr. W. M. Turnbull to be Assistant Superintendent, and Mr. E. C. Grindley as Indoor Assistant to the Superintendent of the Line. On page 432 we are now able to reproduce a new portrait of Mr. Calthrop, taken at Euston. Portraits of Messrs. Horne, Turnbull and Grindley are given on this page and the next.

All these new officers are London and North Western men by training. Mr. Calthrop began in the traffic department in 1886, under the Superintendent of the Line, where he continued in various responsible positions until in 1902 he went to the Caledonian Company as General Superintendent, eventually becoming General Manager in 1908, which position he relinquished only to go to South America, whence he has now returned to receive what is often considered the "Blue Riband" of the railway official world.

Photo] [*Lafayette.*

MR. L. W. HORNE,

Superintendent of the Line, London and North Western Railway.

Like Mr. Calthrop, Mr. Launcelot Worthy Horne is young in years but old in railway experience. All his official life has been spent on the London and North Western Railway, commencing in 1893, first in the General Manager's office, and then under the Superintendent of the Line, culminating in his appointment in 1910 to be London District Superintendent and in 1911 Assistant to the Superintendent of the Line.

Mr. W. M. Turnbull is also North Western to the core, commencing at Rugby and serving afterwards at Rugby, Coventry, Chester, Liverpool, and Birmingham. At the last-mentioned

Digitized by Google

MR. W. M. TURNBULL,
Assistant Superintendent of the Line, London and North Western Railway.

centre Mr. Turnbull was District Superintendent, and thence he went to what has so far been his most important and distinguished position, in charge of the Northern Division, with headquarters at Lime Street, Liverpool.

Mr. Grindley has hitherto occupied a position which has not brought him prominently into public notice. He was born in January, 1860, and entered London and North Western service in the General Manager's Department in June, 1876. Later in the same year he was transferred to the Superintendent of the Line's Department, where he has since remained, becoming Chief Clerk in 1899. Virtually all his official life has thus been spent in the office of Superintendent of the Line, where he now takes one of the chief positions, that of Indoor Assistant.

Further official changes on the London and North Western Railway are notified:—Mr. S. B. Carter becomes District Superintendent, Liverpool, in place of Mr. W. M. Turnbull, now Assistant Superintendent of the Line; Mr. T. E. W. Guest succeeds Mr. Carter as District Superintendent at Manchester; and Mr. J. B. Parkhouse is District Goods Manager at Warrington, in succession to Mr. Guest. Mr. Carter joined the London and North Western Railway in the coaching department at Bushey in 1900, and in 1902 was transferred to the trains office of the Superintendent of the Line. In 1909 he was appointed outdoor assistant to the Superintendent of the Line, until in 1909 he went to Manchester as Assistant District Superintendent, becoming District Superintendent soon after, with headquarters at Exchange Station, Manchester.

The New Superintendent of the Line, G.N.R.

THE Board of the Great Northern Railway Company have appointed Mr. C. T. Selway, Assistant Superintendent, to be Superintendent of the Line, in succession to the late Mr. W. H. Hills. Mr. C. T. Selway entered Great Northern service in 1892, in the Superintendent of the Line's department. Mr. Selway was then transferred to the General Manager's office, under the late Sir Henry Oakley, and became assistant to Mr. Oliver Bury, the late General Manager. In December, 1910, Mr. John Proud, General Superintendent, retired, and when the late Mr. W. H. Hills was appointed Superintendent of the Line, Mr. Selway became Assistant Superintendent. Since 1904 Mr. Selway has been secretary of the Norfolk and Suffolk Joint Directors' Committee, and the Officers' Conference, and upon the institution of the Staff Conciliation Scheme in 1907, he was appointed secretary of the Company's side of the various Conciliation Boards.

* * *

Other Official Changes.

MR. J. C. MORTIMER, Rating Agent to the London and South Western Railway, retired from the service upon superannuation on October 1st. Mr. Mortimer entered the Company's service on October 14th, 1867, as clerk in the Law Clerk's Offices at Waterloo station; Mr. Lewis Crombie being at that time the Company's Law Clerk. He remained in that capacity until June, 1882, when he was transferred to the Rating Department of the Rating and Estate Office. In May, 1883, Mr. Mortimer was appointed Chief Rating Clerk in the Rating Department.

MR. E. C. GRINDLEY,
Indoor Assistant to the Superintendent of the Line, London and North Western Railway.

Digitized by Google

In January, 1902, on the retirement of Mr. A. V. Haines, he was appointed the Company's Rating Agent, and held that office until his retirement after 47 years' uninterrupted service.

Mr. Charles Kislingbury, Divisional Superintendent at Bristol, Great Western Railway, has retired, after completing 49 years service. He joined the Great Western Railway in 1865, and has for the last twenty-two years occupied the post of divisional superintendent of the Bristol and large portions of Somerset, Wilts., and Dorset sections of the Great Western line.

Mr. Herbert Richard Griffiths, who succeeds Mr. Kislingbury as Divisional Superintendent at Bristol, entered the Great Western Railway service in that office in 1877. Nineteen years later he was transferred to the Office of the Superintendent of the Line at Paddington; and in September, 1899, was appointed chief clerk to the Divisional Superintendent at Paddington. Five years later, he again obtained promotion, being made Assistant Divisional Superintendent at Bristol, which position he held until his present appointment. Mr. Henry Rowland Campfield, who becomes Assistant Divisional Superintendent at Bristol, commenced his railway career in the Divisional Superintendent's office at Exeter in 1884, and after experience in various sections of the Traffic department, was appointed chief clerk to the Divisional Superintendent at Pontypool Road in September, 1905. About five years later, he was transferred to a similar position at Worcester; and in May, 1911, he was promoted to the position of Assistant Divisional Superintendent at Cardiff, which office he now vacates. Mr. Frederick George Wainwright succeeds Mr. Campfield as Assistant Divisional Superintendent at Cardiff. Commencing his service with the Great Western Railway Company at Ross in 1888, he was removed to the Superintendent of the Line's office at Paddington in 1905. Five years later, he was appointed chief clerk to the Divisional Superintendent at Gloucester. In February, 1911, he was transferred to a similar position at Cardiff, which post he has held until his recent promotion.

Mr. John Fairclough, chief agent in Ireland for the Great Northern and Great Central Railways, has retired under the age limit. He joined the service of the Manchester, Sheffield and Lincolnshire Railway in February, 1863, so that he has completed over fifty-one years in the railway service. He is succeeded by Mr. James L. Russell.

MR. C. T. SELWAY,
Superintendent of the Line,
Great Northern Railway.

* *

Railway Clearing House Conferences.

At a meeting of the Railway Clearing House Goods Managers' Conference, Mr. H. Marriott, Chief Goods Manager of the Lancashire and Yorkshire Railway Company, was elected Chairman for 1915. Mr. Marriott entered the service of the railway in 1883, and was Assistant Passenger Superintendent from 1896 to 1899. He then, for about nine years, acted as Private Secretary to the General Manager, and for about two years of that period had the title of Assistant Traffic Manager, which title he retained until appointed to be Passenger Superintendent, in November, 1908. Mr. Marriott takes a great interest in the technical education of railway men, and it is largely due to his efforts that the Lancashire and Yorkshire Railway staff enjoy such facilities for enlarging their knowledge of railway working, etc. He succeeded Mr. Wharton

Digitized by Google

as Goods Manager, March, 1910. On the death of Mr. Wharton, in September, 1911, the office of Chief Traffic Manager was abolished, and the scope of Mr. Marriott's control was therefore extended.

The Superintendent's Conference of the Railway Clearing House has elected Mr. A. Watson, Superintendent of the Line and Assistant to the General Manager, Lancashire and Yorkshire Railway, to be Chairman for 1915. Mr. Watson was educated at the Manchester Grammar School and Victoria University, Manchester. In 1890, he was articled to Mr. W. Hunt, Chief Engineer of the Lancashire and Yorkshire Railway, and from 1893 to 1897 acted as assistant to Mr. J. S. Chorlton, one of the resident engineers of the company. During that period Mr. Watson exercised supervision over large and important works which were then being carried out. For two years—first in 1894–5 and again in 1897–8—he served as honorary secretary of the Manchester Association of students of the Institute of Civil Engineers, and in the latter year was appointed Central Division Engineer on the railway. In 1899 he became a Resident Engineer, and, holding that position for six years, had the responsibility of superintending the construction of the five passenger and goods stations which the company provided at Bolton. Having gained the confidence of his superiors in each of these subordinate places, he was in 1905 selected as Assistant Engineer, and in that capacity continued to render valuable service, until appointed to succeed Mr. J. P. Crouch as Passenger Superintendent Mr. Watson entered upon the work of that office on January 1st, 1911. On the death of Mr. J. Wharton in September, 1911, the office of Chief Traffic Manager was abolished, and the duties of the Passenger Superintendent were extended, Mr. Watson then becoming Superintendent of the Line.

Mr. John Bagwell, General Manager, Great Northern (Ireland) Railway, has been unanimously elected Chairman of the Irish Railway Managers' Conference for the year 1915. Mr. Bagwell was from October, 1897, to March, 1899, learning railway work on the Midland Railway. From March, 1899, to November, 1899, he visited the United States and Canada to see if there was anything to learn from railway methods there. In November, 1900, Mr. Bagwell entered the service of the Midland Railway at St. Pancras, under Mr. J. Elliott, then District Passenger Agent in London. In February, 1903, he was appointed Relief District Superintendent on the staff of the then Superintendent of the Line, Mr. T. Eaton. In January, 1905, he was appointed Outdoor Assistant to Mr. J. Elliott, and on the retirement of Mr. Elliott, and the reorganisation carried out at the end of 1909, Mr. Bagwell was appointed Superintendent of Passenger Service. In October, 1911, he was selected to succeed Lt.-Col. Plews as General Manager, Great Northern Railway of Ireland.

Mr. Ammon Beasley, the well-known General Manager of the Taff Vale Railway and of the Penarth Dock, has been elected to be chairman for 1915 of the General Managers' Conference of the Railway Clearing House. Mr. A. Beasley has had over 50 years' Railway experience, largely on the Great Western Railway, upon which he held several important appointments. He was Chief Assistant to the General Manager when in 1891 he was invited to reorganise the Taff Vale Railway, of which he was appointed General Manager. His great knowledge of Municipal trading has been shown in many contributions to the Press in his capacity of President of the Cardiff Property Owners and Ratepayers' Association. When, in 1905, the Bristol Channel Dock Owners' Association was formed, Mr. Beasley was elected the first President. The Association includes in its membership all the principal dockowners in the Bristol Channel from Bristol to Milford, representing a capital of over £20,000,000, and an annual tonnage of 40,000,000. So effective has been the work of the Association under his able guidance that, at the termination of his first year of office, in 1906, Mr. Beasley was unanimously re-elected to the presidency, and he has held the position continuously since that date.

* * *

Railway Officers and the War.

SPEAKING recently at the London School of Economics, Sir Charles Owens, late General Manager, London and South Western Railway, quoted a statement he made some years ago to a leading statesman to the effect that railways would be able to meet national demands in reference to military and naval transport, should the eventuality of war conditions ever arise, far in advance of the requirements of the military and naval authorities, providing that the arrangements *are left in the hands of the railway officers concerned.* The necessity having arisen, experience has shown that this was no empty boast, and in the event the efficiency of emergency transport on an unprecedented scale, when carried out by the railways themselves, has been proved up to the hilt. The situation is, indeed, of so remarkable a character that veritable "wonders of transport" have been achieved without a hitch or indication of weakness. They have been carried out in such a manner that the public hardly realises that the work performed has been anything notable, especially as general requirements have been met with very little disorganisation of ordinary services and without affecting general traffic to any appreciable extent, except perhaps for those first few arduous days in August when national requirements had to supersede everything else.

There are, however, several chief railway officers who are actually serving their King and Country in the fighting line, or in military capacities. Mr. Cecil Paget, General Superintendent of the Midland Railway, has been granted by the Admiralty a temporary commission as Lieut.-Commander in the Royal Naval Volunteer Reserve, and has been appointed to

Digitized by Google

the *Pembroke III.*, additional, for duty with the Royal Naval Air Service. Mr. Kenneth R. N. Speir (Divisional Superintendent, Midland Railway, Derby) and Mr. F. W. Abraham (formerly Divisional Locomotive Superintendent at Derby, and latterly in charge of the motive power section of the London, Tilbury and Southend line), have obtained sub-lieutenancies.

Among the nine thousand odd London and North Western Railway employés who have been recalled to or joined the Colours, not the least interesting military career is that of the popular Superintendent of the Southern Division, Captain G. Newton Ford, The *London and North Western Railway Gazette* for November gives an imposing portrait of Captain Ford in the uniform of the 14th County of London Regiment, better known as the London Scottish. We may quote from our interesting contemporary in this connection: "Capt. Ford joined as a private (as has every member of that regiment) in January, 1896, during the recruiting boom that arose when the present Emperor of Germany sent his well-remembered telegram to the late President Kruger after the Jameson Raid. At that time Captain Ford was in the Superintendent's Office of the North London Railway. In 1897 he passed his examination for Sergeant, obtaining the Special Certificate, and also passing in 'Tactics,' a voluntary subject for Sergeants. In 1898 he was appointed 2nd Lieutenant and posted to 'H' Company; at this time he was Assistant Goods Manager on the North London Railway.

"In 1899 he entered the Officers' School of Instruction at Chelsea Barracks, passing first in the School; he afterwards qualified for Captain and obtained a Special Certificate. He was promoted 1st Lieutenant in 1900, and at this time held the position of Goods Manager on the North London Railway. In 1902 he passed the Captain's Examination in 'Tactics,' and in 1903 was promoted Captain of 'H' Company, having already been in acting command of that Company for the previous 12 months owing to the absence of the gazetted Captain on sick leave. Captain Ford was then Traffic Superintendent of the North London Railway.

"In 1906 Captain Ford resigned his Commission but was recommissioned as Captain in 1910 on the formation of the Territorial Reserve of Officers. He was then Assistant District Superintendent of the Southern Division of the London and North Western Railway. He was called up in August last on the embodiment of the Territorial Forces, and on the formation of the 2nd Battalion of the London Scottish was posted to the command of 'E' Company, and subsequently posted to and placed in charge of the Foreign Service Company formed for the purpose of supplying first reinforcement to the 1st Battalion, which left for the front on September 15th, after having been in training in the neighbourhood of Watford for about a month. Incidentally we may mention that the London Scottish were the first Territorial Regiment to be sent to the front."

Among other appointments held by London and North Western men we may mention that one other Commissioned Officer, namely, Lieut. Hogg, and 287 men from the Southern Division are with the Colours, and 40 men from the North London Railway.

Mr. C. L. Conacher, who, since his retirement from the Cambrian earlier in the year has spent some months abroad for the benefit of his health, has now received a Commission as captain in the Army Service Corps, London District Command, for the period of the War, and has been deputed to act as Railway Transport Officer at King's Cross and St. Pancras Termini, London, succeeding Major Clayton.

Major Butler, Assistant Storekeeper, Midland Railway, is acting as superintendent of railway stores at Havre.

With the British Expeditionary Force in France, serving as a despatch rider, is Mr. C. L. Mason, Works Manager, London and North Western Railway Carriage Works, Wolverton. His portrait appeared in the RAILWAY MAGAZINE, October, 1914.

Mr. Ivor Fraser, Advertising Manager to the Underground Railway and associated undertakings, is now serving with the fleet as Lieut., R.N.V.R., while his chief assistant, Mr. S. H. H. Ellis, is also enrolled as a R.N.R. man.

The following commissioned officers are included in the Great Western Railway's contribution: Lieut.-Col. Salisbury Sharpe, Commanding 2nd London Field Ambulance, R.A.M.C. (T.) (G.W.R. Medical Officer, London); Lieut. J. G. Robinson, London Rifle Brigade (Engineer's Office, Paddington); Capt. C. S. Wilson, Wilts Fortress, R.E. (T.) (Carriage and Wagon Dept., Swindon); Lieut. W. Holttum, 1st City of London R.F. (Engineer's Dept., Chipping Sodbury); 2nd Lieut. E. F. Mocatta, R.F.A. (Engineer's Office, Paddington); 2nd Lieut. S. A. Meller, 15th Battalion, R.F. (Engineering Dept., Wolverhampton); 2nd Lieut. R. H. G. Leveson-Gower, 23rd Battalion, London Regt. (Office of Superintendent of the Line); Lieut. J. Dawson, Wilts Fortress R.E. (T.) (Locomotive Dept., Swindon); Lieut. E. G. Knapp, Wilts Fortress R.E. (T.) (Locomotive Dept., Swindon).

* * *

The Railway Roll of Honour.

THE term "Roll of Honour" is being used in two senses, one applying to the record of those who are serving "King and Country" as army and naval reservists called to the colours, or as territorials or members of the new forces created under Lord Kitchener's direction; the other including those who have suffered in the cause of liberty on the battlefield.

At many railway offices there are now being prepared for exhibition lists of those members of the staff who have joined the forces. From

Digitized by Google

the latest figures available the numbers of railwaymen may be given as follows :—

Alexandra (Newport and South Wales) Docks and Railway	220
Barry	379
Belfast and County Down	58
Brecon and Merthyr	45
Caledonian	1,600
Cambrian	137
Cardiff	500
Clogher Valley	5
Cork, Bandon and South Coast	12
County Donegal	20
Dublin and South Eastern	41
Furness	172
Glasgow and South Western	653
Great Central	2,700
Great Eastern	3,000
Great Northern	2,500
Great Northern (Ireland)	229
Great North of Scotland	220
Great Southern and Western	450
Great Western	8,109
Highland	183
Hull and Barnsley	445
Isle of Man	3
Isle of Wight Central	25
Isle of Wight	25
Lancashire and Yorkshire	3,668
London and North Western	9,528
London and South Western	2,100
London, Brighton and South Coast	1,510
Londonderry and Lough Swilly	9
Maryport and Carlisle	20
Metropolitan	322
Midland	6,700
Midland (Northern Counties Committee)	134
Midland Great Western Railway	77
Neath and Brecon	15
North British	2,000
North Eastern	5,400
North London	204
North Staffordshire	370
Port Talbot	72
Sligo, Leitrim and Northern Counties	5
South Eastern and Chatham	1,702
Taff Vale	577
Underground Electric Railways	931
	56,925

So far only one or two railways give details of the numbers involved in the "Roll of Honour" of actual service. The *London and North Western Gazette* claims 6 killed in action, 3 dead from wounds, 89 wounded and sick, and 41 missing or prisoners of war.

On the Great Western Railway there are, so far, 12 killed, 1 died in hospital, 3 missing, and 26 wounded.

* * *

Railway Steamers and the War.

RECENTLY the South Eastern and Chatham Railway Company's turbine vessel *The Queen* rescued in mid-Channel about 2,000 French refugees from the steamer *Amiral Ganteaume* after she had struck a mine. It is recognised that it was due to the skilful manner in which Captain Carey of *The Queen* manœuvred his vessel that so many lives were saved. On the arrival of *The Queen* the Local Government Board and the War Refugees' Committee acted with great promptitude. Three special trains from Folkestone were arranged for, and during the night 1,994 of the refugees journeyed to London, arriving at Alexandra Palace at about one o'clock the next morning. *The Queen*, which was put into service in June, 1903, was the first turbine steamer introduced for cross-Channel travel. With the exception of the *Invicta*, she was the longest steamer built up to the time of her launching for the Dover-Calais route, her length being 310 ft., beam 40 ft., and depth to level of promenade deck 25 ft.

A few days later another of the South Eastern and Chatham Company's turbine vessels, the *Invicta*, assisted in rescuing the survivors of the *Hermes*, torpedoed by a German submarine.

On Thursday, November 5th, the South Eastern and Chatham Railway announced a revised Continental service as follows : Charing Cross 8.15 a.m., Boulogne 12 ; leaves Boulogne 1 p.m., reach Paris 8.45 p.m. Charing Cross 2.5 p.m., Boulogne 5.30 ; no connection with Paris. Boulogne 11.30 a.m., Charing Cross 3.10 p.m. Paris 7.35 a.m., Boulogne 3.30 p.m. ; leaves Boulogne 4, reach Charing Cross 8.15.

* * *

Miscellaneous Items.

ON Thursday, November 5th, the Turkish Ambassador and his suite left Charing Cross by the Folkestone boat express, special cars being attached. Mr. Walford Selby, one of Sir Edward Grey's private secretaries, was present at the station and before leaving the Minister expressed to Mr. Selby his gratitude for the arrangements made by the Government. The party travelled *via* Folkestone and Flushing to Constantinople.

Warehouses Nos. 5 and 6 at the King George Dock at Hull, owned jointly by the North Eastern and Hull and Barnsley Railways (described in the RAILWAY MAGAZINE for August, 1914) have been utilised to form barracks for the North Eastern Railway Battalion. These warehouses intercommunicate and have a combined length of 790 ft. and a width of 70 ft., while each has a ground floor and a first floor. The roofs, too, are flat. In the north-west arm of the dock, and alongside the barracks, is moored the Hull and Netherlands steamship *Rieraulx Abbey*, which forms the officers' quarters. On the ground floor of the barracks are situated the officers' room, orderly room, mess rooms, drill hall and armoury, miniature rifle range, kitchen, stores, canteens, guard room, armourer's room, a recreation room, writing room, and a bathroom. Upper floors are taken up by the dormitories and lavatories.

Valuable work is being done in France by a small body formed from the railway staff, in dealing with parcels sent to the forces. This unit consists of only six in all, two from the Continental office of the London and South

Digitized by Google

Western Railway, and the remaining four from other railways. They are attached to the Royal Engineers. Immediately on enlistment they were sent to the Continent to supervise the despatch of parcels, etc., for the troops, one of the qualifications being a good knowledge of the French language.

Among refugees from Belgium arriving recently in Derby were the General Manager of the Belgian State Railways, and his wife and two daughters. They are the guests of Sir Arthur Heywood, of Duffield Bank, Derby.

Dover Town railway station has been converted into an ambulance station, and all the traffic has been diverted to the Harbour station.

* * *

Great Military Camp at Wendover.

A REMARKABLE sight is now to be seen at Wendover, the quaint fifteenth century village in Buckinghamshire. At a short distance from the railway station, the great slopes crowned by the Chiltern woods are seen to be covered by interminable stretches of wooden trellis work, the skeletons of wooden framed houses, whilst ceaseless clattering denotes an army of carpenters completing these edifices for the use of the troops during the winter season. Some 20,000 soldiers are now in training at Wendover, the camp containing a Smiths' bookstall, the usual canteens and a picture palace. Fresh arrivals are pouring in each day, and many thousands more are expected to make Wendover their winter quarters. The troops at present are sheltered in bell tents; but the wooden huts, with six windows on each side, raised from the ground on brick abutments, and roofed with galvanised iron, will shortly be available, and form comfortable and sanitary dwelling places during the coming inclement weather. The transformation of this medieval village into the busy scenes of activity which now characterises it forms an interesting spectacle; and the Metropolitan Railway point out that their cheap service of trains from East-end, City and Baker Street to this beautiful part of the country is available at week-ends to those desirous of witnessing the making of an army.

* * *

Metropolitan Railway Drill and Shooting Corps.

UPON the outbreak of War, the Management of the Metropolitan Railway took into consideration the question of some contribution towards national defence. It was decided to form a Drill and Shooting Corps to be composed of servants of the Company above enlistment age. Support to the movement was instantly forthcoming and a drill and shooting corps formed which is expected to number some 500 men. A firing range was found and rifle butts constructed at Wembley Park. The range was formally opened in the presence of a numerous company by Mr. R. H. Selbie, General Manager, Metropolitan Railway, and Director of the Rifle Corps. In the course of his opening speech, Mr. Selbie referred to the enthusiastic manner in which the movement had been supported by the officers and servants of the Company. Whilst regretting that he, with the rest of those associated with the Corps were born too early to be of assistance to the Country in the actual field, Mr. Selbie expressed his judgment that in view of an eventuality which he trusted might never arrive, but the possibility of which had nevertheless to be faced, the association of the Metropolitan men whose headquarters he had the privilege of declaring formally open, would in a small way at least, do their best, if called on, in defence of their Country. Mr. Selbie then fired the first shot and as stated declared the Rifle Range open.

* * *

War Equipment on Canadian Railways.

WE have already referred to the Concentration Camp at Valcartier, and the following additional Canadian "War" items will be of interest. Military commissary kitchen cars have been equipped by the Canadian Pacific Railway in order to cope with the problem of feeding the men through the journey, as none of the existing railway equipment could be directly used for the service, the dining car service being entirely inadequate and unsuited to the requirements. The Canadian Pacific Railway solved the difficulty by converting twelve standard 60 ft. baggage cars into commissary kitchen cars. Essentially, each of the cars is a well-appointed hotel kitchen on wheels, and comprises three main sections, kitchen proper, butcher's shop and pantry. The interior corridor arrangement resembles the Company's compartment cars, as from each end the passage leads from the central entranceway and along a 2 ft. 1 in. corridor on one side of the car. The two baggage door openings on the corridor side are fitted with permanent screens for ventilation purposes, and the similar openings on the other side have been blocked up. For serving the meals the orderlies from each company file in from one end of the car, line up in front of the counter, are allotted the portions for their men, and pass out of the other end as rapidly as served. The operation of the car is said to be most satisfactory, exceeding the expectations, the capacity of each car being 1,000 meals three times a day. The crew consists of twelve men in charge of a steward, one of the twelve being a boiler man, and the others cooks. On the Canadian Northern Railway two cars have been equipped for service as a hospital unit in conjunction with the Canadian military concentration camp at Valcartier. One is a standard colonist car, used as a ward, and the other is a baggage car, used as the hospital commissary. Both cars are now in service at Valcartier, where they are located on a camp siding. The colonist car is 72½ ft. long over body, of the standard Canadian Northern Railway type, and contains eighteen sections, providing accommodation for thirty-six patients in the upper and lower berths. There is a small kitchen at one end of the car, which is to be used as the hospital kitchen, and across the aisle from this kitchen section is a small baggage storing space. This end of the car in the ordinary colonist car

Digitized by Google

also contains the woman's toilet and lavatory, and at the other end the men's lavatory and heater room. The hospital commissary car is a standard 60 ft. baggage car, provided with electric light, steam heat, etc., as in the other car. It is used as a local hospital commissary and office car for the medical attendants. It is also possible that it may be used as an operating car, as the military authorities are making internal changes in its arrangement.

* * *

Official Changes on the Great Eastern Railway.

IN consequence of the retirement of Mr. F. G. Randall, Superintendent of the Line, all the traffic departments have been co-ordinated and placed under the charge of Mr. W. C. May, Chief Goods Manager, who now assumes the title of Chief Traffic Manager. This change of organisation brings the Great Eastern into line with several other companies.

In Mr. Randall the Company loses one of its best-known officers, and one who has risen from the ranks of the service. Mr. Randall began railway work in 1869, as clerk to the stationmaster at Ipswich. Later, he was engaged at Harwich and Chelmsford. In 1877 he was appointed relieving stationmaster in the Eastern district. Subsequently, he was for 10 years stationmaster at George Lane, Woodford, and when a vacancy occurred at Bethnal Green Junction, he was entrusted with the responsible duties of stationmaster there. In 1897 Mr. Randall received the appointment of Superintendent at Liverpool Street Station. At the end of 1910, after 41 years' service with the Great Eastern Railway, he was appointed to succeed Mr. R. P. Ellis as Superintendent of the Line, and entered upon his new duties on January 1st, 1911.

MR. HORACE WILMER, M.INST.C.E.
Chief Engineer,
Great Eastern Railway.

Mr. William Clacy May, the first officer to hold the appointment of Chief Traffic Manager on the Great Eastern Railway, has also spent the whole of his railway service with that Company, commencing in the Rates Office of the Goods Department in January, 1886. After serving there in various capacities he was in 1895 appointed to represent the Great Eastern Railway on the London Corn Exchanges. This position he held until 1897, when he was transferred to the Mineral Department as Outdoor and Coal Exchange Representative. This post he filled for two and a half years, till in July, 1900, he was given the important position of Chief Assistant to the Mineral Manager, and in March, 1903, he was promoted to the office of Mineral Manager. In March, 1910, he was appointed Chief Goods Manager, with control of the Mineral Department, and he now assumes direction of the whole of the traffic section.

Changes have also occurred in the Engineering Department of the Great Eastern Railway, consequent upon the retirement of Mr. Harry Jones, the well-known chief engineer. Mr. Jones began his professional career in 1867, as a pupil to the late Mr. Edward Wilson. Two years later Mr. Jones undertook the supervision of the construction of the Bala and Dolgelly Railway for the Great Western Railway, followed by a similar responsibility in connection with the extension of Liverpool Street station. His period of pupilage completed, he was appointed Assistant Engineer on the lines that now form part of the Great Western system between Pontypool, Caerleon and Newport, and also on those from

Digitized by Google

Banbury to Cheltenham. Mr. Jones was then given charge, as Resident Engineer, of the projected lines between Ipswich and Felixstowe, Netherton and Halesowen, and Bewdley and Kidderminster, the two last-mentioned being eventually acquired by the Great Western Railway. After the death of Mr. Edward Wilson, Mr. Jones was entrusted by the Great Eastern Railway first with the East Norfolk extension from Wroxham to County School, and subsequently with the construction of the Wisbech tramway. When Mr. John Wilson, one of the partners in the firm of Messrs. Edward Wilson & Co., became Chief Engineer of the Great Eastern system, Mr. Jones acted as Resident Engineer on the lines that were then laid between Cambridge and Mildenhall, and in Essex between Shenfield, Southend and Woodham Ferris. His next promotion occurred in 1889, when he was chosen for the more important office of District Engineer of the Eastern Division. On the retirement of Mr. Wilson in the early part of 1910, Mr. Jones was appointed to the position of Chief Engineer of the whole of the Great Eastern system.

Mr. Jones is succeeded by Mr. H. Wilmer, who has hitherto been in charge of the London district, with headquarters at Stratford.

Mr. Horace Wilmer, M.Inst.C.E., who succeeds Mr. Harry Jones as Chief Engineer, was born in 1851 and was educated at Rugby School. In 1871 he passed into the Indian Civil Engineering College, Coopers Hill, and was appointed in 1874 Assistant Engineer 2nd grade in the Indian Public Works Department. He was employed for two years under Col. Sankey, R.E., in works of irrigation in the province of Mysore, but for domestic reasons resigned his appointment in 1876 and returned to England. He entered the service of the Great Eastern Railway Co. in May, 1877, and was employed as Resident Engineer on the construction of the Bishopsgate Goods depot. In 1882 he was appointed Engineer of the Southern Division and has remained in charge of this division up to the present time. During that time he has carried out extensive works of construction and has had considerable experience of the maintenance of permanent way.

* * *

"It's a long, long way to Tipperary."

This statement, embodied in the popular song of the day, is not altogether correct, seeing that Tipperary County is approximately central to the southern portion of Ireland, and the town of Tipperary is fairly conveniently reached *viâ* the Dublin-Cork main line of the Great Southern and Western Railway, or the Rosslare-Waterford-Limerick route of the old Waterford-Limerick and Western line, now included in the Great Southern and Western system. Tipperary station is the first from Limerick Junction towards Clonmel and Waterford, and is only 52½ miles from the last-mentioned station. Considerable comment has been made in some of the newspapers as to how far distant in point of time Tipperary is from London; and decidedly conflicting statements have been made. *Viâ* Fishguard and Rosslare one can leave Paddington at 8.45 a.m., and reach Waterford at 6.53 p.m.; but one has to wait then until 9 p.m. to go on to Tipperary, due at 11.47 p.m. By the night service, leaving Paddington at 8.45 p.m., and Rosslare Harbour at 5.40 a.m., Waterford is reached at 7.10 a.m., but the 7.0 a.m. train on is just missed so that it is 10.15 a.m. before the passenger can travel further, and Tipperary is not reached until 11.58 a.m.

By the London and North Western Route the 8.45 p.m. Irish Mail from Euston connects with the 6.40 a.m. from Kingsbridge to Limerick Junction (arr. 9.12), and this serves the 9.20 a.m. train thence, reaching Tipperary ten minutes later. By the 10.15 p.m. boat-train from Euston, Tipperary can be reached at 12.48 p.m. the next day; but the 8.30 a.m. service from Euston involves a long wait at Limerick Junction, so that the now famous Irish town is not reached until 1.20 a.m.

* * *

Fares on the Isle of Wight Railway.

Some time ago, statements made here and elsewhere to the effect that third class fares on the Isle of Wight Railways are now arranged on a uniform basis of one penny per mile were challenged on account of the seeming inconsistencies occurring with fares including the Ryde Pier Head and Esplanade stations. The matter was placed before Mr. Russell Willmott, Secretary and General Manager of the Isle of Wight Central Railway, and he replies as follows:—

"All passenger fares between interior Island stations and Ryde (Esplanade and Pier Head) stations under Act of Parliament (South Western and Brighton Act, 1877) have to include a 3d. pier toll, which is payable to and received by the Ryde Pier Company. The third class fares are really 1d. a mile fares plus this toll. In consideration of paying this toll, the railway passenger can use for himself and his luggage the promenade pier of the Ryde Pier Company and also the electric tramway thereon *without extra charge*, and this fact is being given full publicity in the Island and in future publications of this Company."

* * *

"Country Homes."

One of the results of the European War is that there are an unusual number of householders changing their residences; because in addition to the normal number who by reason of growing families require more accommodation, there are many having several sons absent with the armed forces of the crown who no longer need such large establishments as heretofore. For the guidance of house seekers of all descriptions, the Metropolitan Railway issues a quarterly booklet, "Country Houses," which is sent post free on application to the Commercial Manager, Mr. John Wardle, Baker Street Station, London, N.W. Charming districts are served by the

Digitized by Google

Metropolitan Railway, and by use of the extension line from Baker Street the city man may journey comfortably each day between his place of business and a healthy homestead amid the woods and meadows of the beautiful countryside that lies to the north-west of the Metropolis.

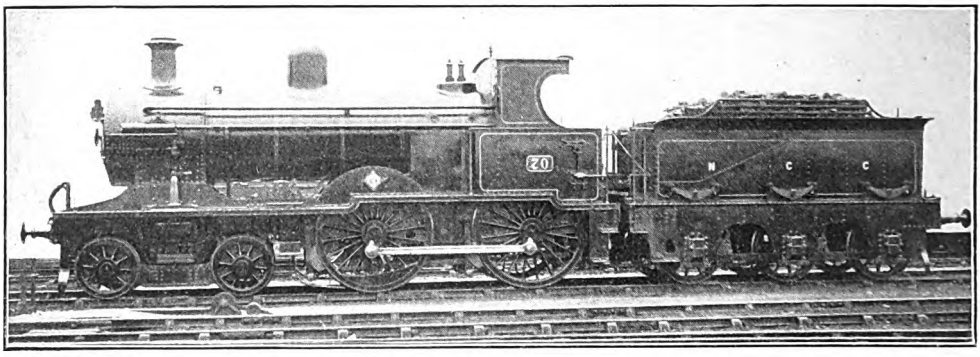
* * *

Railways and Mobilisation.

THE guests of honour of the American Luncheon Club at the Savoy a few days ago were the members of the Railway Executive Committee of Great Britain, from whose chairman, Mr. H. A. Walker, General Manager of the London and South Western Railway, was obtained an interesting statement of the speed and accuracy with which British railways handled military traffic at the outbreak of war. "The Government gave the railways," remarked Mr. Walker, "a time-limit of 60 hours to make ready for dispatch to Southampton, the port of departure for the Expeditionary Force, 350 trains of, roundly, 30 vehicles each. We 'delivered the goods,' as you Americans would say, in 48 hours. At Southampton, for practically every day of the first three weeks of the war, we handled during a period of 14 hours no fewer than 73 of these trains, including the running of them to the boat side and the unloading of the full equipment of guns, ammunition, and horses. The trains arrived at intervals averaging 12 minutes."

Mr. H. W. Thornton, General Manager of the Great Eastern Railway, formerly General Superintendent of a railway in the United States, said that so far as his knowledge of great transportation achievements went, there was no event in railway history to compare with what British lines had accomplished in August, 1914. Certainly in America, the land of "big stunts," there had never been anything like it.

4-4-0 SUPERHEATER LOCOMOTIVE: MIDLAND RAILWAY (N.C.C. Section).



Hitherto the Midland broad gauge lines in Ireland, belonging to the Northern Counties section, have been largely worked, as regards express passenger traffic, by 2–4–0 locomotives, most of them being Mr. Bowman Malcolm's well-known 2-cylinder compound engines. In these new locomotives, however, Mr. Malcolm has adopted the 4–4–0 type, non-compound, but fitted with Schmidt superheaters, and by Mr. Malcolm's courtesy we are now able to illustrate this interesting class.

Leading dimensions are as follows:—

Gauge	5 ft. 3 in.	Heating surface—Tubes	876 sq. in.
Cylinders	19 in. by 24 in.	Firebox	110·5 ,,
Coupled wheels	6 ft. diam.	Superh't'r	275 ,,
Bogie wheels	3 ft. diam.	Total	1,261·5 ,,
Coupled wheelbase	8 ft. 2 in.	Grate area	18 sq. ft.
Engine ,,	21 ft. 3 in.	Coal capacity of tender	6 tons.
Steam pressure	170 lbs. per sq. in.	Water ,, ,,	2,090 gallons.
Adhesion weight	31 tons 4 cwt.	Tender wheels	3 ft. 7¾ in. diam.
Weight of engine	47 tons 12 cwt.	Weight of tender	29 tons 5 cwt.

Weight of engine and tender in working order, 76 tons 17 cwt.

Digitized by Google

At this time of the year Stratford-on-Avon, the home of England's greatest poet, William Shakespeare, lying as it does in the midst of as fair a country as the heart of an Englishman can desire, is a most delightful and restful place for a holiday, and as there must be a great many people who, for one reason or another, have had to postpone their usual summer outing to the seaside, a better place than Stratford-on-Avon could not be found. All the popular forms of sport, hunting, fishing, golf, etc., can be indulged in, and all who can should not fail to enjoy a respite, however short, from the strenuous labours engendered by the anxious and troubled times of the past two or three months. Stratford-on-Avon is within easy reach of London, through coaches running daily to and from Marylebone, and the Stratford-upon-Avon and Midland Junction Railway, "Shakespeare Route" (commonly styled the S.M.J.), connecting as it does with the "Comfortable" Line (Midland), the "Business" Line (London and North Western), and the "Line of Health" (Great Central) justly claims to afford every facility for reaching this desirable spot. While in the neighbourhood visitors should make a trip to Morton Pinkney for Sulgrave, the ancestral home of America's Soldier Statesman, George Washington, the first President of the United States.

* * *

The postponed competition for the Bartholomew Bowl, offered annually by Mr. R. W. Bartholomew to Great Central Railway Ambulance Teams, took place at Blakesley Hall on September 19th. The result of the competition was announced as follows: 1, Gorton (Works), 290; 2, Lincoln, 268; 3, Dukinfield (Carriage Works), 241; 4, Neasden, 240½; 5, Tuxford, 217; 6, Woodford (Carriage and Wagon), 216½; 7, Woodford B, 215½; 8, Immingham, 198; 9, Gorton Running, 186; 10, Annesley, 153. Wath, who won the cup on the last two occasions, were unable to compete, owing to three of their men serving in military hospitals. Other teams were also minus some of their men on this account. Luncheon was provided by Mr. Bartholomew, who presided. Mr. White, proposing the health of Mr. Bartholomew, said Ambulance work to-day was even more important than it ever had been. He was sure railway ambulance corps would show themselves to advantage if and when they were called upon. Mr. Bartholomew, in reply, said they were now having it impressed upon them how necessary it was to look after the suffering. It was thought that they should not hold that competition, but it was pointed out to him that when the older members were at the front they should give the younger ones a chance to show their skill. A collection taken on behalf of the Blakesley Red Cross Committee, realised 27s. A vote of thanks was accorded the Stratford-upon-Avon and Midland Junction Railway for their granting of free passes to the men.

* * *

Leasowe Castle, one of the establishments maintained by the Railwaymen's Convalescent Homes, has been taken over by the Army Council in connection with Coast Defence work, and is, therefore, not available for patients, but arrangements have been made whereby subscribers who, in the ordinary way, would have been accommodated at the Castle during convalescence, will be received into other suitable convalescent homes if they are unable to make the journey to Herne Bay. This latter Home is receiving patients as usual, the 30 beds reserved for sick and wounded British soldiers and sailors not interfering with the daily routine.

* * *

The Lothian Coast expresses introduced about two years ago on the North British Railway, inaugurated in modern days a schedule of 60 min. between Edinburgh (Waverley) and Glasgow (Queen Street). Commencing November 1st, however, the 9.35 p.m. from Glasgow was accelerated 5 min., bringing it to the 60-min. standard, except that 4 min. extra are allowed if the Polmont conditional stop is made. There is also a new newspaper express on Sunday mornings, usually consisting of engine and van, leaving Queen Street at 5.15 a.m., and due to reach Waverley at 6.13 a.m., an allowance of only 58 min.

* * *

A new tourist programme dated November 1st has been issued by the Lancashire and Yorkshire Railway. It deals with the various facilities offered by the railway during the winter months, including Saturday to Monday, week-end, tourist and other tickets to suit the needs of this part of the year. Copies can be had on application at stations or town offices, or direct from the Superintendent of the Line at Victoria Station, Manchester.

Digitized by Google

A DRASTIC alteration came into force on October 18th, when the Great Eastern Railway Weekly Working Time Table and the Green Notice of New Works, etc., were considerably reduced in size. Much of the semi-permanent information hitherto contained in these weekly notices has been transferred to a pink supplement which also embodies the information previously contained in the supplement to the Weekly Working Time Book.

* * *

On Thursday, November 12th, Mr. J. F. Gairns, Editor of the RAILWAY MAGAZINE, read a paper at the Railway Club on "Railway Nationalisation: Is it Desirable, Practicable, or Probable?" Mr. W. Parker, President, occupied the chair. The paper gave rise to an interesting discussion. At the meeting on December 8th, Mr. J. B. Sherlock will read a paper on the West Highland Section of the North British Railway, illustrated with lantern views.

* * *

IN addition to members of the Railway Club already noted as having joined the Forces, the following may be noted: Lieut. D. Errington, H.M.S. *Attentive*; Major E. V. Fox, North Staffordshire Regiment; and Privates A. K. B. Brandreth and V. McCracken, both of the University and Public School Corps, Royal Fusiliers. A number of the members, including the President, are serving their country in the capacity of special constables.

* * *

THE United Kingdom Railwaymen's Welfare Association (President: George A. Wills, Esq., J.P., Director Great Western Railway; Hon. Treasurers: Miss E. Saunders (one of the Founders), G. H. Morris, Esq.; General Secretary: H. Edward Rossiter) was formed some years ago for promoting religious, temperance, social, educational and institutional work amongst the railwaymen of the United Kingdom. The Central Offices are at the Railwaymen's Institute, Bath Bridge, Bristol. The committee will cordially welcome the co-operation of all who are interested in promoting on broad and practical lines the welfare of the men engaged in railway service.

* * *

ON Saturday, October 31st, Mr. E. L. Ahrons, M.I.M.E., read a valuable paper before the Institution of Locomotive Engineers on "The Internal Disturbing Forces in and Balancing of Locomotives (with special reference to Three- and Four-Cylinder Engines)." On Saturday, November 21st, Mr. W. H. Nethercott was announced to read a paper on "Locomotive Boiler Examination Defects and Repairs in the Running Shed."

* * *

ON Tuesday, November 3rd, the inaugural meeting of the ninety-sixth session of the Institution of Civil Engineers was held at the palatial building in Great George Street, Westminster. Proceedings were commenced under the direction of the retiring President, Mr. Lister, who then introduced the new President, Mr. Benjamin Hall Blyth, M.A., who selected for the subject of his address a review of engineering development in Scotland during the period 1864–1914. In view of Mr. Hall Blyth's association with railway engineering in Scotland, and particularly with the reconstruction of Waverley Station, Edinburgh, and the North British Railway Docks at Methil, his address dealt largely with railway engineering in Scotland though he also considered bridge, municipal, dock, water and other branches of engineering.

* * *

LORD MERTHYR has been elected a Director of the Cardiff Railway to fill the vacancy on the Board caused by the death of the late Lord Merthyr

* * *

THE EARL OF DALKEITH, who succeeds to the Dukedom of Buccleuch and Queensberry, following the death of the late Duke, was elected a Director of the North British Railway in the first half of 1900, Deputy-Chairman in the latter part of 1903, and Chairman in the first half of 1905. In 1912 he retired from the post of Chairman, since ably occupied by Mr. William Whitelaw, but accepted the post of Deputy-Chairman. which he still holds,

* * *

THE last two of the old Cornwall Mineral Railway signal boxes, the one at St. Blazey Gate, and the one at Bugle, are being replaced. These boxes were high, mostly of wood, with a ridge roof one way only parallel to the line. The new boxes are of usual Great Western Railway design. The Great Western Railway took over the line at the end of the 'seventies.

* * *

AT Barrow the Furness Railway has provided laying-up accommodation for several Belgian Line steamers now banished from Antwerp.

* * *

IN spite of wars and rumours of wars, Christmas is coming, and it behoves all who are concerned in the welfare of children that they should not allow the claims of war and refugee funds to detract from the usual Yuletide support of the railway orphanages. Mr. Cecil Smith, the honorary treasurer of the Children's Fund in connection with the Railway Servants' Orphanage at Woking, is particularly desirous that there should be no falling off in gifts, whether in money or in kind, in order that Christmas at the Orphanage may be observed as a season of good cheer. Donations to the Maintenance Funds are likewise sought by Mr. H. G. Warne, the energetic and capable secretary of this well-managed institution.

* * *

THE Great Western Railway has now extended the "top feed" principle to the small side tanks (2-4-0 type) which are still very extensively employed, although more than a quarter of a century old. The clack-boxes, as usual with the older pattern of domed boiler, deliver the feed water between the smoke-box and the dome. Some of these comparatively old but still highly efficient little machines have been fitted with Belpaire fire-boxes.

Digitized by Google

WRITING in *The Referee*, a contributor expresses approval of London and North Western Railway rolling stock in the following terms: "Manchester sounds a long way off, but in reality it is nothing like so far away as many places which are only half the distance. This seems Irish, I know, but when you remember that nowadays one measures distance less by its mileage than by the time it takes to cover that mileage, you will realise that it is just plain common sense. Anyhow, last Sunday there seemed to be 'A Few Days' Calm' ahead in theatrical activities, and in Manchester Miss Horniman was re-opening the Gaiety with a new play by Miss Gertrude Robins, so I said 'Euston' to the taximan and—well, there I was you know. As I had only returned from France the night before, I was reflecting, after a pleasant lunch on the train, that I was really what the Americans call some traveller, when I awoke with a start to find myself at London Road, Manchester, and half the leading articles on the progress of the Allies unread. It wasn't my fault. There are some railways—I'm on one at this moment—where you simply couldn't sleep, not even if you had been two days and two nights in the trenches, but the North Western expresses slip along so smoothly that the wheels seem to sing an irresistably soothing lullaby. Your eyes close, your head nods, and before you know where you are, you're there."

* * *

ALTHOUGH less well-known in the railway world than in the regions of finance, Mr. Walter Cunliffe, upon whom the Prime Minister in his speech at the Lord Mayor's banquet announced King George had been pleased to confer a peerage, is a director of the North Eastern Railway, in addition to being Governor of the Bank of England.

* * *

SIR WILLIAM SHAW WRIGHT, Chairman of the Hull and Barnsley Railway, died on November 10th at his residence, The Holt, Scalby, near Scarborough. Sir William was knighted this year. Seventy-one years of age, he has left a widow, two sons and one daughter.

* * *

No. 85, the last of the batch of six large "Consolidation" goods and mineral engines built at the Midland Railway Works at Derby for the Somerset and Dorset Joint Railway, has now been delivered.

* * *

IN the accident at Andover Junction, on October 13th, when an express goods train collided with a shunting goods train, the former was being worked by one of Mr. Urie's new 4-6-0 engines, No. 488. This was not, however, seriously damaged.

* * *

THE latest poster issued by the Underground Railways is entitled "When in Doubt take the Underground." This poster has been executed by the celebrated artist, Mr. John Hassell, and serves to illustrate the utility of the Underground in almost every conceivable eventuality.

THE post of Secretary of the Associated Society of Locomotive Engineers and Firemen, rendered vacant by the death of Mr. Albert Fox, of Leeds, has been filled by the appointment of Mr. John Bromley, Manchester, district organiser of the Society.

* * *

We are asked to note that the Imperial Fine Art Corporation, Ltd., of 64, High Holborn, London, W.C., are selling sample boxes of high class Christmas cards in embossed cabinet boxes, each set containing 12 up-to-date booklet cards with envelopes, at 1s. 2d., post free. These are produced in Great Britain.

THE Paris, Lyons and Mediterranean Railway announce that a passenger and mail through service is now running between Paris and Nice, *viâ* Lyons and Marseilles, performing the whole journey in 21 hours: Paris, dep. 8.5 p.m.; Lyon, arr. 5.49 a.m., dep. 6.11 a.m.; Marseilles, arr. 11.30 a.m., dep. 12.5 noon; Nice, arr. 5.13 p.m., dep., 10.8 a.m.; Marseilles, arr. 3.50 p.m., dep. 4.16 p.m.; Lyon, arr. 9.45 p.m., dep., 10.8 p.m.; Paris arr. 7.15 a.m. Passenger's personal luggage is now accepted for registration without restriction in weight. The extension and further improvement of the Riviera service is to be expected shortly.

* * *

THE report of the South African Railways and Harbours for the year ending 31st December, 1913, shows the following statistics:—Total mileage open lines, 8,281; lines in construction or authorised, 1,250 miles; capital expenditure (railways), £82,574,580; capital expenditure (ports and harbours), £11,910,974; passengers carried during year, 43,208,222; goods and coal carried during year, 14,611,517 tons; minerals carried during year, 104,176 tons; cargo handled at ports, 5,881,086 tons; total of staff (white), 32,356; total of staff (coloured), 30,310; total earnings for year (gross), £12,388,755; total expenditure for year (gross), £8,954,690; number of engines, 1,458; number of coaches, etc., 2,472; number of trucks, etc., 25,007; number of motor vehicles, 7; number of automatic machines, 423; number of lighthouses, 21.

* * *

WRITING to the *Railway News*, a correspondent points out that on January 1st, 1914, there was a total of 6,001 interlocking plants of all kinds (mechanical and power) in use on United States Railways, and of this number 687 plants are all-electric, and 221 plants electro-pneumatic. The report does not show the total number of working levers of each type of plant, but it does show the grand total of working levers for all types, which was 142,514 levers. He further mentions that the Taylor system had alone a total of 23,436 working levers on 1st January, 1914, representing 16·4 per cent. of the grand total of 142,514 levers. 44,461·2 miles of track are equipped with automatic signals, and of this 38,025·9 miles, or 85·5 per cent., is electric, while but 1,415·6 miles, or 3·1 per cent., is electro-pneumatic.

Digitized by Google

THE Grand Trunk Railway has recently introduced automatic signals across the Victoria Jubilee Bridge over the St. Lawrence River, and the approaches thereto. The bridge has accommodation for two steam and one electric railway tracks, with also a large roadway and footpath. The steel work is about 6,600 ft. long. The new signalling installation includes the equipping of the double track from Point St. Charles on the Montreal end to St. Lambert on the south shore of the river—a distance of about 3½ miles. At the St. Lambert end the automatics work into a new sixty-four lever all-electric interlocking plant. Four other railways lease running rights over this bridge, the Central Vermont, the Delaware and Hudson, the Quebec Montreal and Southern, and the Intercolonial. On account of extremely heavy traffic the length of the sections were made comparatively short, ranging from 2,500 to 3,600 ft.

* * *

MR. E. J. CHAMBERLIN, President of the Grand Trunk and Grand Trunk Pacific Railways, has returned to Montreal after a tour of inspection of the companies' lines. He reports that he found the line in British Columbia in much better condition than he expected; in fact, the work done is remarkable considering that 480 miles were graded and track laid in 12 months through the mountains of British Columbia. There is now a first class track as far west as Prince George, B.C., and at least half of the track between Prince George and Prince Rupert is finished, while the balance of it has a first and much of it a second lift of ballast, and compares to-day very favourably with other railroad lines in the North West. A through sleeping car train is now being run twice a week between Edmonton and Prince Rupert, connecting with the through trains to Winnipeg, and this is being well patronised and giving very good service to the people. Freight trains are also running regularly through to Prince Rupert.

* * *

THE Bombay, Baroda and Central India Railway announce that the Directors will propose, at the general meeting to be held in December next, the payment in January next, in addition to the half-year's guaranteed interest of £1 10s. per cent., of an interim dividend of 10s. per cent. in respect of the Company's profits for the financial year 1914–15.

Railway Literature.

THE BRITISH RAILWAY SYSTEM. By Henry Grote Lewin, B.A. (Cantab.). [G. Bell & Sons, Ltd. Price 2s. 6d. net.] Mr. Lewin was formerly district superintendent at York, and later Mineral Train Superintendent, North Eastern Railway. This volume is described as outlines of railway development to the year 1844, and is a valuable addition to railway literature. Various chapters deal with early railways in the Durham district, and with Scottish, Lancashire and London railways, besides dealing systematically with railways authorised in 1836, the railway systems of 1836-9, 1839-42, 1842-44, and with passenger train services of 1840. Not the least valuable feature is the series of large maps showing in colours and with dates the railways of the respective periods under review. In view of the Railway Commission, and the importance which is now given to the subject of Railway Nationalisation, the volume merits special attention. The frontispiece gives a diagram showing mileage authorised and constructed each year from 1821 to 1843.

* * *

MODERN RAILWAY WORKING. There are still too many men in the railway world who do not see the advantage of all-round knowledge; they carry specialization too far. These men cannot see that if they are to secure a really high position they must possess practical knowledge of all departments.

It is not too much to say that it is this attitude which is largely to blame for the fact that one of our largest railways was recently forced to look abroad for a General Manager.

That the Executive Officers of our great railways recognize the importance of this point is made abundantly clear by the recent remarks of Viscount Churchill, G.C.V.O., Chairman of the Great Western Railway, of which the following is an extract :—

"We have a number of good young men coming on, whose careers are the subject of constant observation by myself and the chief officers of the Company. It is our endeavour to give these rising men every opportunity possible of broadening their experience, so that when the time arrives for them to succeed to leading positions in the service, they may be equipped with a thorough knowledge of railway working and capable of taking the broadest view of the many important subjects with which they will then have to deal."

One of the very best means of acquiring such a complete knowledge open to the railwaymen of this country is afforded by Modern Railway Working to which we have from time to time referred as the volumes appeared.

This is the only book we know of covering all the departments. It is as authoritative as it is complete, and is so ably written that although many sections with highly technical matters it can be read with interest even by those who have no special knowledge of railway matters.

The fine illustrations add very much to the general interest of the volumes and are also really useful. This remark particularly applies to the flat models (made up in coloured cardboard) showing the construction of a locomotive and a coach.

Digitized by Google

FLEXIBLE METALLIC TUBING.
For Loco Feed Water Pipes. Thousands in Use.
Indestructible by Oil, Heat or Dirt.

UNIVERSITY OF ILLINOIS

THE Railway Magazine.

6D.

DECEMBER, 1914.
No. 210. Vol. XXXV.

THE UNITED FLEXIBLE METALLIC TUBING CO., Ltd.
Registered Offices: 112, QUEEN VICTORIA STREET, LONDON.
Works: PONDERS END, MIDDLESEX.

Digitized by Google

3 CLASSES OF STEEL SHEETS SPECIALLY ADAPTED TO THE REQUIREMENTS OF LOCOMOTIVE & CARRIAGE & WAGON BUILDERS

MADE BY

JOHN LYSAGHT. LIMITED.

ORB · IRONWORKS,

TRADE MARK.

NEWPORT. MON.

① CHARCOAL · FINISH
② COLDROLLED & CLOSEANNEALED.
③ ORDINARY · OPENANNEALED.

SEND · FOR · PRICES —— AND DESCRIPTIVE · LEAFLETS

ALL · SPECIALLY · FLATTENED AND · RESHEARED · EXACT TO GIVEN DIMENSIONS

N.B. NO PLANING OF EDGES · OR HAMMERING REQUIRED.

Gold Medal Franco-British Exhibition. 1908.

DECOLITE

Composition (Fire-Resisting) Flooring

MADE AND LAID BY BRITISH LABOUR.

For RAILWAY COACHES, Electric Stock, Mail Vans, Kitchen Cars, Lavatories, etc., etc., also for Offices, Factories, Warehouses, Hospitals, etc.

DECOLITE is Hygienic, Tough and Hard-wearing, Warm and Elastic to the Tread. Fire-resisting, Vermin Proof, Damp Proof. For New Buildings, etc., also for overlaying existing Wooden, Stone, Cement or Steel Floors.

"Salamander" Asbestos Millboard.

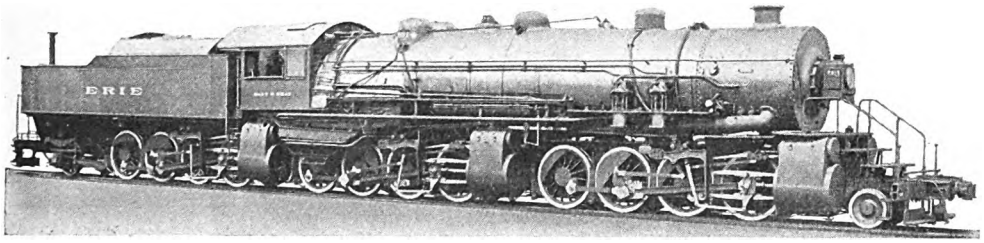
FIRE-PROOF. EXCELLENT NON-CONDUCTOR.

BELLS UNITED ASBESTOS Co., Ltd.,

SOUTHWARK STREET, LONDON.

Digitized by Google

BALDWIN



Triplex articulated compound locomotive, Erie R. R.

Wm. Schlafge, General Mechanical Superintendent.

Cylinders, 36 × 32 inches. Water heating surface, 6,886 sq. ft. Driving-wheels, diameter 63 inches. Superheating surface, 1,584 sq. ft. Steam pressure, 210 lbs. Weight on driving-wheels, 761,600 lbs. Grate area, 90 sq. ft. Weight, total engine, 853,050 lbs. Tractive force, 160,000 lbs.

The locomotive illustrated represents a new design, recently introduced for heavy pushing and freight service on [steep grades. It develops as much tractive force as three large eight-coupled locomotives. The cylinders are arranged on the compound principle, two being used as high pressure and four as low pressure. The equipment of this locomotive includes a superheater, mechanical stoker, brick-arch, combustion chamber and power reverse gear.

The Baldwin Locomotive Works build all kinds of railway motive power—including **internal combustion locomotives,** which are proving successful in light switching, industrial and plantation service.

The BALDWIN LOCOMOTIVE WORKS

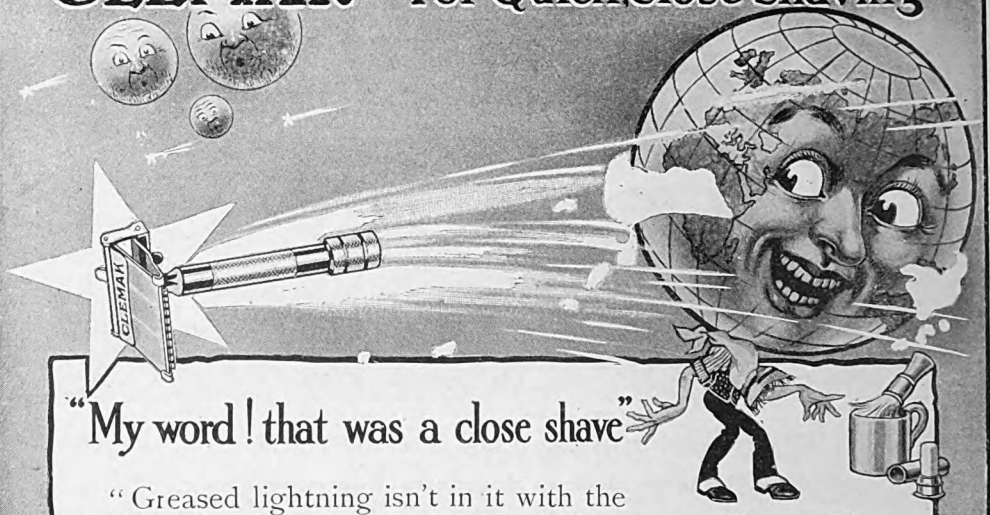
PHILADELPHIA, Pa., U.S.A.

ALBA B. JOHNSON, Jr., General Agent,
34, VICTORIA STREET, LONDON, S.W.

Cable Addresses: "BALDWIN, PHILADELPHIA"; "FRIBALD, LONDON."

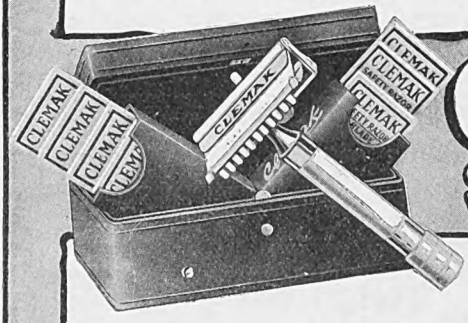
Digitized by Google

CLEMAK —For Quick Close Shaving



"My word! that was a close shave"

"Greased lightning isn't in it with the Clemak. Never saw anything like it in all my life. Just a dab or two with the lather brush, a pass or two with the Clemak, and I'm shaved. And best of it is, same thing happens every morning—no trouble ever."



CLEMAK 5/- Safety Razor

5/- Silver-plated Clemak Razor with stropping handle and seven blades.

Combination Outfit: A Triple Silver-plated Razor, Twelve specially selected Blades, Patent Stropping Machine, with Velvet Hide Strop

10/6

The Clemak is a sturdily-made British Safety Razor which combines unsurpassed efficiency with a simplicity quite unique. No razors shave better than the Clemak; none give less trouble. It's cleaned in a moment, stropped in a minute; there's nothing to remove, nothing to adjust.

An Ideal Present for our SOLDIERS, SAILORS and TERRITORIALS.

OF ALL CUTLERS, STORES, &c.,

or from the

CLEMAK RAZOR CO., 17, Billiter St., London, E.C.

The Clemak Book will interest you. Write for a Copy to-day.

W. PLANT & CO., Market St., Sydney, sole Australasian Agents.

Digitized by Google

The "ROBINSON" LOCOMOTIVE and MARINE SUPERHEATERS

Are BRITISH INVENTIONS, the Patent Rights are Entirely BRITISH OWNED, and the Superheater Corporation Ltd., —— operating such Patents has —— no connection with any other Company.

Full particulars can be obtained from the Offices of the Company:—

PALACE CHAMBERS, WESTMINSTER, LONDON, S.W.

"A SOUND RUNNING SHED JOB."

THE

RAILWAY CLUB.

Founded in 1899 to bring together those interested in Railways and Locomotives.

Subscription:

LONDON MEMBERS, £1 1s. per annum;
COUNTRY MEMBERS, 5s. per annum.

CLUB PREMISES & LIBRARY IN LONDON

Open Daily 10 a.m.

MEETINGS COMMENCE AT 7.30 P.M.

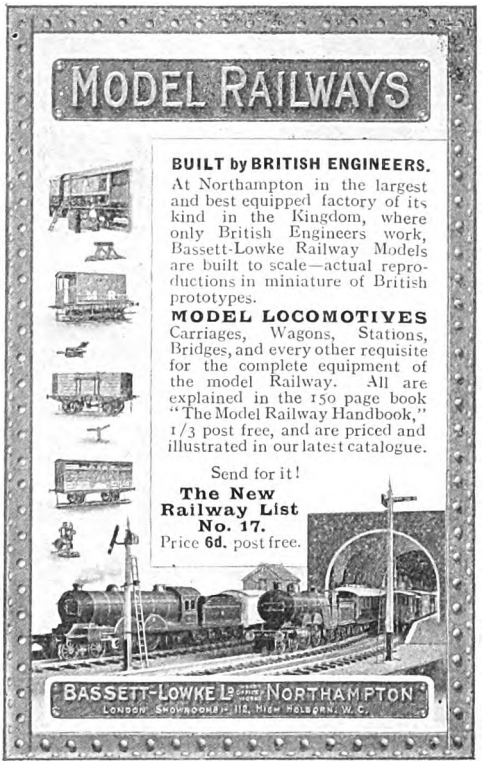
COMING EVENTS:

December 8th.—West Highland Section of North British Railway (with lantern views). *J. B. Sherlock.*

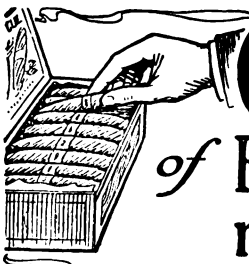
January 12th.—Annual General Meeting. Election of Officers, etc.

For information apply—

Secretary,
92 VICTORIA STREET,
LONDON, S.W.


MODEL RAILWAYS
BUILT by BRITISH ENGINEERS.
At Northampton in the largest and best equipped factory of its kind in the Kingdom, where only British Engineers work, Bassett-Lowke Railway Models are built to scale—actual reproductions in miniature of British prototypes.
MODEL LOCOMOTIVES
Carriages, Wagons, Stations, Bridges, and every other requisite for the complete equipment of the model Railway. All are explained in the 150 page book "The Model Railway Handbook," 1/3 post free, and are priced and illustrated in our latest catalogue.
Send for it!
The New Railway List No. 17.
Price 6d. post free.
BASSETT-LOWKE LTD NORTHAMPTON
LONDON SHOWROOMS: 112, HIGH HOLBORN, W.C.

Digitized by Google



Gifts of Fragrant memory

NOTHING more acceptable—nothing in better taste. Possessing that elusive charm of fragrance which characterizes only the most expensive cigars, Flor de Dindiguls are strictly reasonable in price. Well-matured, mild, of exquisite aroma, and peculiar richness of "flavour," they appeal to the smoker of refined tastes. They are cool and even-burning to the end. Each a delightful memory.

3d. each, 5 for 1/1. Boxes of 25 for 5/3, 50 for 10/3. Flor de Dindigul Extra (extra choice), 4d. each, 7/6 per box of 25. Of all tobacconists, or from the Importers: BEWLAY & CO., 49, Strand, London, W.C.

Established in the early reign of George III.

Flor de Dindigul CIGARS

THE SHILLING BOX OF TRAIN DISSECTED PUZZLES.

Four engines or trains mounted on wood pulp and dissected; key plates included. Best quality. London made. A delightful present for :: :: a small boy. :: ::

Price: ONE SHILLING.

No Extra Charge for Postage.

RAILWAY PUBLISHING CO., LTD.,
30, Fetter Lane, Fleet St., London, E.C.

To H.R.H. THE PRINCE OF WALES,
Buckingham Palace, London.

I beg to enclose £ s. d as a donation to the National Relief Fund.

Name.....

Address.....

.....

The envelope containing this coupon need not be stamped.

Have Your . . . Magazines Bound.

Odd magazine parts make a litter, but Bound Volumes make Splendid Books.

Collect your "Railway Magazine" Parts and send them to us, to be bound in half-yearly volumes.

Send the Parts securely packed in Carriage Paid parcels, and they will be returned beautifully bound, in red cloth, gold lettered cases, post free in the United Kingdom.

2/6 for One; **4/9** for Two; and **7/-** for Three Volumes.

Send Remittance with Order.

RAILWAY PUBLISHING Co., Ltd.,
30, Fetter Lane, Fleet St., London, E.C.

Digitized by Google

The
HULL & BARNSLEY RAILWAY
are owners of the
ALEXANDRA DOCKS, HULL,

which possess commodious warehouses, sheds, cellars and cold stores—electric, hydraulic and steam cranes—seven modern coal hoists—two large dry docks, &c., &c. The home of steamers regularly trading to and from all parts of the Globe.

The River Pier, Hull.

Available for use at any state of the Tide. Furnished with two electric coal conveyors (each capable of shipping 600 tons per hour), nine electric cranes, capacious warehouse accommodation, &c.

Also Joint Owners with the North Eastern Railway of the new KING GEORGE DOCK, HULL.

The largest and most modernized dock on the North East Coast, having extensive warehouses—swift working coaling appliances of high capacity—free moving electric cranes—two dry docks, &c., &c.
And of the

Salt End Oil Jetty, Hull.

Available on all Tides. Depth of water L.W.O.S.T. 30 feet. Vessels can discharge direct to tanks through Pipe Lines.

The Company's Railway links up the City and Port of Hull with all parts of the United Kingdom.

EDWARD WATKIN,
General Manager,

Telegrams: "Junction, Hull." Hull and Barnsley Railway, HULL.

Digitized by Google

Digitized by Google

METROPOLITAN RAILWAY.

Live amid the Woods & Meadows

NUMEROUS charming Residential districts are served by the Metropolitan Railway, offering to those who seek health and pleasure the utmost satisfaction. For the guidance of House-seekers the Company issue a quarterly booklet, "Country Homes," which will be sent, post free, on application to the Commercial Manager, Baker Street Station, N.W.

Particulars of sites available for Factories and Works obtainable from the Company's Estate Agent.

R. H. SELBIE, General Manager.
Baker St. Station, N.W.

BRIGHTON RAILWAY.

FOR YOUR HEALTH'S SAKE MAKE A SOJOURN
ON THE

SUNNY SOUTH COAST.

BRIGHTON
HOVE
WORTHING
SEAFORD
EASTBOURNE
BEXHILL
ST. LEONARDS
HASTINGS

FOR OVER A CENTURY thousands of visitors have been restored to health at the Sunny Resorts on the South Coast.

The many natural advantages, remarkable sunniness, beautiful scenery and equable climate of the South Coast are great restoratives, keeping residents and visitors in tip-top form.

The towns, sheltered from cold winds by the picturesque South Downs, are highly recommended for Winter residence.

CHICHESTER
BOGNOR
LITTLEHAMPTON
HAYLING ISLE
SOUTHSEA
PORTSMOUTH
AND THE
ISLE OF WIGHT.

WINTER ON THE
SUNNY SOUTH COAST.
HIGHEST SUNSHINE RECORD.

Guide Books and full details from R.M. 12, Publicity Dept., L. B. & S. C. Rly., London Bridge Terminus.

Digitized by Google

SITES
For WORKS, FACTORIES, &c.

There are numerous sites adjacent to the L. & N.W. Railway Company's System suitable for the erection of Factories and Works of all description, and at some places vacant manufacturing premises are available.

The L. & N. W. Railway Company serve or are in direct communication with all the large manufacturing towns, ports and coal centres of the United Kingdom, and afford unrivalled facilities for the rapid transmission of merchandise.

Manufacturers and others seeking sites for the development of industries should communicate with Mr. A. Feiron, Publicity Dept., Euston Station, London, N.W., who will be pleased to submit full information regarding available sites, siding possibilities, and also such particulars as cost of water, gas, electricity, etc.

Euston Station,
London.

GUY CALTHROP,
General Manager.

QUICKEST ROUTE
LONDON (King's Cross) and

BRADFORD	in 3 hours	48	mins.	
DEWSBURY	„ 3	„ 32	„	
SHEFFIELD	„ 2	„ 58	„	
WAKEFIELD	„ 3	„ 5	„	
LEEDS	„ 3	„ 25	„	
GRIMSBY	„ 3	„ 33	„	
NEWCASTLE	„ 5	„ 26	„	
EDINBURGH	„ 7	„ 50	„	

Restaurant Cars are attached to principal trains from and to King's Cross.

Great Northern Hotels at King's Cross, Peterboro, Nottingham, Leeds, Bradford.

For full particulars of train service apply to Supt. of the Line, King's Cross Stn., London, N.

C. H. DENT, *General Manager.*

Digitized by Google

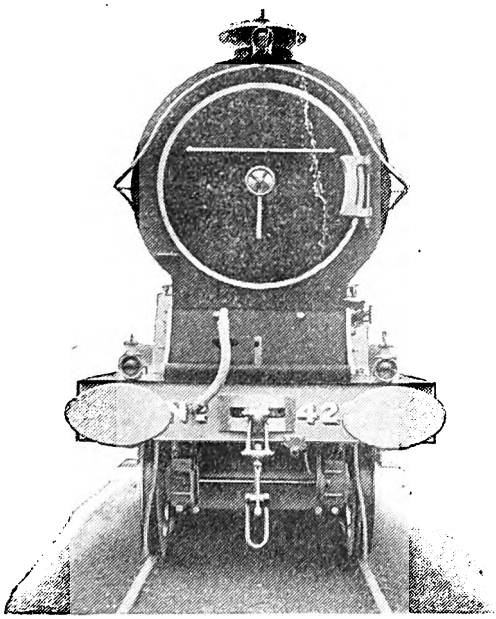
THE RAILWAY MAGAZINE.

Contents for December, 1914.

		PAGE
COLOUR PLATE—Four-coupled Superheater Express Locomotive: South Eastern and Chatham Railway	*Facing*	417
DUKINFIELD CARRIAGE AND WAGON WORKS: GREAT CENTRAL RAILWAY. *Illustrated*	J. F. GAIRNS	417
A NEW PORTRAIT OF MR. GUY CALTHROP, GENERAL MANAGER, LONDON AND NORTH WESTERN RAILWAY		432
RECENT AMERICAN FREIGHT LOCOMOTIVES. *Illustrated*		433
BRITISH LOCOMOTIVE PRACTICE AND PERFORMANCE. *Illustrated* ..	CECIL J. ALLEN	440
LEAVES FROM THE LOG OF A LOCOMOTIVE ENGINEER (No. XXVII.). *Illustrated*	ROBERT WEATHERBURN	451
EXCEPTIONAL LOCOMOTIVES IN BRITISH DESIGN AND PRACTICE (No. II.). *Illustrated*	J. FRANCIS	455
RAILWAY ELECTRICAL PROGRESS AND PRACTICE. *Illustrated* ..	"INDICATOR"	463
RAILWAY COMPANIES AND MOTOR ROAD TRACTION. *Illustrated*		470

Contents continued on page xi.

G.C.R. RESTAURANT CAR SERVICE



BETWEEN

LONDON (MARYLEBONE), RUGBY, LEICESTER, NOTTINGHAM, SHEFFIELD, HUDDERSFIELD, HALIFAX, BRADFORD, MANCHESTER, &c.

YORK, MANCHESTER, BRADFORD, SHEFFIELD, NOTTINGHAM, LEICESTER, OXFORD, SOUTHAMPTON and BOURNEMOUTH, with direct connection to the ISLE OF WIGHT.

NEWCASTLE, YORK, SHEFFIELD, NOTTINGHAM, LEICESTER, CHELTENHAM, GLOUCESTER, NEWPORT, CARDIFF and BARRY.

MANCHESTER, BRADFORD, HALIFAX, HUDDERSFIELD, SHEFFIELD, NOTTINGHAM, LEICESTER, BATH and BRISTOL.

MANCHESTER, SHEFFIELD, GRIMSBY and CLEETHORPES.

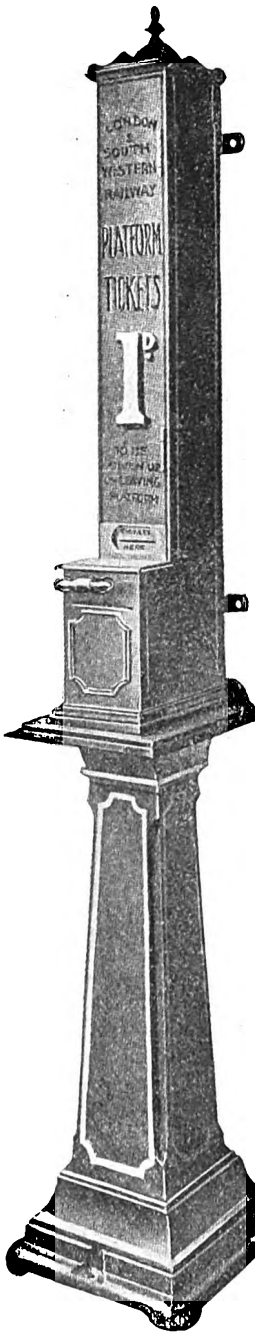
MEALS SERVED À LA CARTE AT ANY TIME TO SUIT THE CONVENIENCE OF PASSENGERS.

For particulars of Train Service and Special Travel Facilities, etc., apply any Great Central Station Agency, Dean & Dawson's Offices, or send post card to Publicity Dept., 216, Marylebone Rd., London, N.W.

SAM FAY, General Manager.

Digitized by Google

Platform Ticket Issuing Machines



For Delivery of
Platform
—or—
Short Distance Tickets.

∴

Reliable and Trustworthy.

IN USE
ON NEARLY ALL THE
PRINCIPAL ENGLISH RAILWAYS
—and—
Colonial and Foreign Lines.

∴

British Made Throughout.

∴

The workmanship in these Machines is the product of 30 years skilled experience in Automatic Mechanisms of all kinds. Every part is interchangeable and can be adjusted by any booking-clerk in a few moments.

The machine on the left is designed for use at small stations, and though of high-class construction throughout, the Company are enabled to supply it at a much less cost than the larger machine.

1d. 1½d. or 2d.
TICKETS.

Full particulars on application to:

Dept. T **The British Automatic Company, Limited,**
14, APPOLD STREET, LONDON, E.C.

Digitized by Google

Contents—continued.

	PAGE
EXTENSION OF THE "BAKERLOO" RAILWAY TO QUEENS PARK: An Important Underground Development. *Illustrated*	475
AIR COMPRESSORS IN RAILWAY SERVICE. *Illustrated*	478
RAILWAY ENGINEERING AND EQUIPMENT. *Illustrated*	481
PERTINENT PARAGRAPHS. *Illustrated*	487
4-4-0 SUPERHEATER LOCOMOTIVE: MIDLAND RAILWAY (N.C.C. Section.) *Illus.*	496
WHAT THE RAILWAYS ARE DOING	497
RAILWAY LITERATURE	500

Annual Subscription, 7s. 6d., post free (Canada and Newfoundland, $1.71 cents or 7s.), payable in advance. Single copies (if in print), 8½d. each, post free.

Registered at the General Post Office for transmission by Magazine Post to Canada and Newfoundland.

The Editor will not be responsible for the safe return of MSS., Photographs, etc.

All Articles and Illustrations submitted must be accompanied by a stamped addressed envelope, for return in case of non-acceptance.

(*ALL RIGHTS RESERVED.*)

Editorial, Advertisement, and Publishing Office: 30, FETTER LANE, FLEET STREET, LONDON, E.C.
TELEPHONE: HOLBORN 2087.

The WEIR SYSTEM of Locomotive Feed Heating and Boiler Feeding

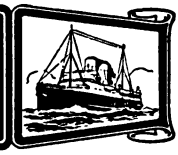
Effects a substantial saving in fuel; ensures absolute certainty of action, combined with a feed flexibility and an accuracy of adjustment hitherto impossible; is free from complications, and is easily installed and controlled.

G. & J. WEIR, Ltd., Cathcart, Glasgow.

Digitized by Google

Digitized by Google

L.S.W.R.



BRITISH TRADE EXPANSION.

TO MANUFACTURERS & TRADERS—

Particulars of Sites suitable for Factories and Works can be obtained on application to

THE PUBLICITY DEPARTMENT,
L. & S.W. Rly.,
WATERLOO STATION, S.E.

LAND OWNERS & ESTATE AGENTS

with Properties for sale in the vicinity of the London & South Western Rly. are also invited to communicate with the above Department.

H. A. WALKER, General Manager.

MIDLAND RAILWAY—LONDON TILBURY and SOUTHEND SECTION

To SOUTHEND-ON-SEA and WESTCLIFF-ON-SEA

Shortest and Quickest Route from and to **FENCHURCH STREET STATION** (City) by Non-Stop Trains to and from

SOUTHEND-ON-SEA IN 50 MINUTES
WESTCLIFF-ON-SEA „ 45 „

RESIDENTIAL SEASON TICKETS—Quarterly Rates from any Date

	FIRST CLASS 3 Months	THIRD CLASS 3 Months	
SOUTHEND and WESTCLIFF	£6 - 6 - 0	£3 - 15 - 3	Monthly, fortnightly and weekly season tickets also issued.

Through Trains run daily between Ealing Broadway and Southend, calling at District Line Stations.

Alight at MARK LANE STATION (City) District Railway for the Non-Stop Trains from FENCHURCH STREET STATION.

Through tickets issued from stations on the Metropolitan District, Metropolitan, and North London Railways.

Passengers travelling by the Central London Railway and other Tube Lines can take train to or from the BANK STATION, which is within easy distance of FENCHURCH STREET STATION.

Cheap week-end Friday to Tuesday tickets 6/- first class, 3/6 third class Return from Fenchurch Street Station, St. Pancras, &c.

At all stations ask for tickets "By THE TILBURY & SOUTHEND ROUTE."

For further particulars see time tables or apply to the Manager, London Tilbury and Southend Section, Fenchurch Street Terminus, E.C.

Digitized by Google

Now Ready. **Price 2s. 6d. net.**

MR. LEWIN'S NEW BOOK.

The British Railway System

BY

HENRY GROTE LEWIN, B.A.

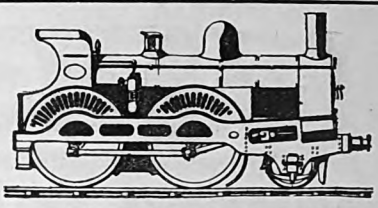
Formerly District Superintendent, York,
Mineral Train Superintendent, N.E.R.

WITH 8 MAPS. 2/6 NET.

Mr. Lewin has devoted many years to the study of the early history of British railway development, and in this book he provides a great deal of information for the student which is not accessible in any other form. A special feature is the series of very valuable maps which Mr. Lewin has prepared as a result of his investigations.

Obtainable at all Bookshops.

G. BELL & SONS, LTD., LONDON, W.C.
York House, Portugal Street.



..MODELS..
RAILWAYS AND LOCOS.

The only journal devoted
Solely to the construction
. . of working Models. . .

Edited by HENRY GREENLY.

PUBLISHED MONTHLY. Price 3d.
4/- annually. Post Free to all parts.
Volumes No. 2 and 3. 5/- net, postage 5d.

Write for a Specimen Copy to —

MODEL RAILWAYS PRESS,
Aldine House, Crown Court,
Chancery Lane, LONDON, W.C.

DELICIOUS COFFEE.

RED WHITE & BLUE

For Breakfast & after Dinner.

A BOUND VOLUME OF THE

RAILWAY MAGAZINE

MAKES A SPLENDID CHRISTMAS GIFT
FOR ANYONE INTERESTED IN

LOCOMOTIVES & RAILWAYS.

Each volume is profusely illustrated.
Price 5/- By Post 5/6. Abroad 6/-
Vols. 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 & 35.
Orders taken by any newsagent or bookseller,
or at any railway bookstall.

"RAILWAY MAGAZINE" OFFICE,
30, Fetter Lane, London, E.C.

At the present time there are no finer Watches on the Market than
OWEN'S ENGLISH LEVERS.

Forty years have been spent in the Manufacture of these High-Class Watches.
We are making the Experiment to place upon the Market a Real Highly-
Finished Watch at a medium price—**Silver, 50/-, 63/-, and 75/-**

15/- OUR NOTED LEVER WATCH.
IN GUN METAL CASES. Warranted.
SCHOOLBOY'S WATCH, 10/6.

OWEN & ROBINSON, LTD., Leeds.

Digitized by Google

At all times you should

WATCH YOUR INVESTMENTS CAREFULLY

but especially

DURING THE WAR.

The Financial Review of Reviews

The Leading Magazine on Investment

Contains authoritative articles and statistical matter of the utmost value to investors during the present world-wide financial crisis.

Purchasers of this REVIEW can obtain constant and reliable news and advice regarding their investments by using the FREE INFORMATION SERVICE placed at their disposal. :: ::

1/- NETT. ON SALE AT ALL BOOKSTALLS, OR FROM THE PUBLISHERS,

2, Waterloo Place, Pall Mall, London, S.W.

Our Corner Stone is Universal Service for Home Beauty.

GARDENING is a delight to the Young, a solace to the old.

WHAT IS IT?

The famous ONE & ALL Seeds give exquisite Flowers and delicious Vegetables at a trifling cost. Thousands of prizes have been won with them.

The One & All motto is "Purity with Economy."

Illustrated Catalogue Post Free.

ONE & ALL,

92 Long Acre, London, W.C.

Edwd Owen Greening

Managing Director.

Asters. Stocks. Sweet Peas. Wall-flowers. Pansies.

Peas. Beans. Potatoes. Lawn Grasses. Bulbs.

THE GARDEN BEAUTIFUL. THE HOME HAPPY. THE NATION PROSPEROUS.

Digitized by Google

The Railway Magazine.

ESTABLISHED July, 1897. Published Monthly. Price 6d. By post, 8½d. Annual Subscription, 7s. 6d. post free (Canada and Newfoundland $1.71 or 7s.) payable in advance.

Railway Year Book.

PUBLISHED annually in March. Illustrated with 37 maps. 366 pages. Cloth. Price 2s. 6d. net. Post free in British Isles, 2s. 10d.; abroad, 3s.

Superheating on Locomotives.

BY J. F. Gairns. Second Edition. All types of superheaters fully illustrated; including a large folded chart of the Schmidt Smoke-tube Superheater. Price, 2s. 6d. net. By inland post, 2s. 9d. Abroad, 2s. 10d.

Locomotive Shed Notes.

RECENT publication. Illustrated. Should be studied by all who desire new knowledge of the steam locomotive. Price 2s. 6d. net. By post, 2s. 9d.

Lectures on the Working of Locomotive Engines.

BY D. Drummond, M.I.C.E. New Edition. Sold for benefit of London and South Western Railway Servants' Orphanage. 202 pages, well illustrated. Price 1s. 6d. net. By post, 1s. 9d.

The Railway Clerk's Assistant.

BY G. B. Lissenden. A very useful book. Price 1s. 6d. net. By post, 1s. 8d.

French Railways.

BY Lord Monkswell, D.L. Cloth. Illustrated. Price, 3s. 6d. By post, 3s. 10d. Abroad, 4s.

Railways of Great Britain.

BY Lord Monkswell, D.L. Cloth. Illustrated. 303 pages. Price 6s. net. By post, 6s. 4d. Abroad, 6s. 6d.

The Railways of the World.

BY Ernest Protheroe. Illustrated by 16 colour plates and 419 Photographic reproductions. 752 pages. Cloth. Price 7s. 6d. By post, 8s.

The Ways of our Railways.

BY Charles H. Grinling. New and Revised Edition, 350 pages. Illustrated. Cloth. Price 5s. net. By post, 5s. 6d. Abroad, 6s.

Wonder Book of Railways.

PICTURE Boards. 264 pages. 300 illustrations. Twelve Colour plates. A grand book for boys. Price 3s. 6d. By post, 4s. Abroad, 4s. 6d.

Historic Locomotives

and "Moving Accidents" by Steam and Rail. By Alfred Rosling Bennett, M.I.E.E. A fascinating book illustrated with ten splendid colour plates. Price 2s. 6d. By post, 2s. 9d.

The Fixing of Rates & Fares.

BY H. Marriott, Goods Manager, Lancashire and Yorkshire Rly. Cloth. Price 2s. net. Postage 3d.

Shilling Box of Train Dissected Puzzles.

EACH box contains four engine or train puzzles. A delightful present for a small boy. Price 1s. No charge for postage.

Large Colour Plates of Locomotive Engines.

EIGHT Colour Plates of British Locomotives:—Great Eastern, No. 1853; Great Northern, No. 1452; Great Western, No. 4031; Lancashire and Yorkshire, No. 1421; London and North-Western, Nos. 66 and 2663; London and South-Western, No. 443; and South-Eastern and Chatham, No. 504. Size of each plate, 20 by 12 inches. Magnificent pictures for framing. Full particulars of dimensions. Price per plate, post free, 4d. each. SPECIAL OFFER.—The Complete Set of 8 Plates, 2s. 6d., post free, to any part of the world.

Small Colour Plates, Engines.

SIX Colour Plates, each size 9½ × 6½ inches, forwarded post free on receipt of 2d. for each plate if more than one plate is ordered. Price of one plate only is 2½d. G.E.R., 1505; L. & N.W.R., 2222; Midland, 483; S. & D. Joint, 80; and G.N.R. (I), 174. S.E. & C.R., 764.

Small Colour Train Plates.

FIVE plates, Great Central, Great Eastern, Midland, North British, and L. & N.W. Sizes and Prices same as Small Engine Plates.

Large Colour Train Plates.

GREAT Western Railway Irish Boat Express; Great Eastern Railway Restaurant Car Train; London and North-Western Railway American Special; London and South Western Railway North Cornwall Express. Size of each plate, 9½ by 19½ inches. Unfolded copies of these four beautiful plates, price 4d. each, or four for 1s. 3d. No extra charge for postage.

L. & Y. Train Plate.

MAGNIFICENT colour Picture, size 12 by 10 ins., unfolded and in tube. Selling rapidly. Price 3d. No extra charge for postage.

G.W.R. Locomotives.

RECENT publication. Photogravure Plate 20 by 15 inches, representing nine types G.W.R. Engines. Price 6d. net. By post in tube, 7d.

Bound Volumes.

"RAILWAY MAGAZINE," Half-yearly Vols. 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34 and 35. Price 5s. each. By inland post, 5s. 6d.; abroad, 6s.

Binding Covers.

RED cloth, gold-lettered binding cases for "Railway Magazine," each to bind six parts, Vols. I. to XXXV. Price 1s. each. Postage for one case, 3d. If more than one is ordered at one time, add 1d. postage for each cover after the first.

Mackay's Photographs.

RAILWAY Trains at full speed. List of 6d. photographs free on application.

THE RAILWAY PUBLISHING CO., LTD.,

30, Fetter Lane, Fleet St., London, E.C.

DECEMBER, 1914. **Telephone: Holborn 2087.**

Digitized by Google

What is the advice of 30 Railway Engineers & Specialists worth—to YOU?

What would you give to secure the advice and assistance of a recognised authority in every department of railway working? What would you pay to secure his aid in any difficult case that may obstruct your path to promotion—and a bigger salary?

£10—£20—£50—*in fact would you not pay practically any sum demanded, if only it were possible to secure such an inestimable boon?*

It is possible

Indeed, it is easy to secure this immense advantage over those who have to "pick up" their knowledge when and how they can. You can secure it now—at trifling cost.

The experience of experts in all departments of railway knowledge has been gathered together, carefully collated by distinguished Editors and published in book form. In this great and unique book, "MODERN RAILWAY WORKING," you can study the duties of the men immediately ahead of you, secure a practical knowledge of matters with which your present duties do not bring you in touch, and thus qualify yourself for rapid promotion.

Mr. Henry Fowler writes on "Railway Lighting"; Mr. Philip Dawson, M.Inst.C.E., M.I.M.E., M.I.E.E., writes on "Electric Traction"; Mr. Frederick M'Dermott, Editor of *Railway News*, writes on "The Constitution of Railway Companies"; Mr. James Clayton, of the Midland, writes on "The Locomotive Department"; Mr. A. B. Jocelyn, A.M.I.C.E., writes on "Reinforced Concrete for Railways"; Mr. Thomas Nash, formerly Director of the Sheffield Testing Works, writes on "Testing Materials"; Mr. W. C. Copperthwaite, M.Inst.C.E., constructor of the Blackwall, Greenwich and Rotherhithe tunnels, writes on "Tunnel Construction"; Mr. G. N. Shawcross, M.I.M.E., writes on "Workshop Practice and Equipment"; Mr. Walter Chalmers, of the North British Railway, writes on "Locomotive Maintenance and Repair"; while "Signalling and Train Control" is dealt with by Mr. H. E. Morgan, of the W. R. Sykes Interlocking Signal Company.

Your future depends upon your action NOW!

The Railway Official Gazette says—

It is difficult to refer to the excellencies of this work without being thought to exaggerate. We hold no brief for this publication, but can say, without fear of contradiction, that it presents the finest and most complete study of railway working that has ever been presented. Its value to the young and ambitious railway man cannot be over estimated, for it gives him . . . a knowledge and control over the intricacies of a subject which could only with great difficulty be otherwise obtained. To the elder men who have made great strides up the ladder of success it offers information, some of which must be new and of advantage.

We close the last volume with a sigh of regret, that the work is now completed, and heartily commend "MODERN RAILWAY WORKING" to all those who wish to succeed, as a very valuable aid to the realisation of their ambition in the railway world.

The Great Western Railway Magazine says—

Great Western Railway readers need no telling of the advantages accruing from a knowledge of the organization and operations of the several railway departments. An acquaintance with matters outside one's own department has long been recognised as desirable. "MODERN RAILWAY WORKING" brings to hand a very helpful means of progress in this direction.

The Railway Clerk says—

We are glad to be able to recommend this Encyclopædia to railway clerical workers, as we believe a study of it will add to their knowledge and efficiency. We consider that the railway specialist will be able to do his work better if he has a theoretical knowledge of other sections of work and of their relation to his section.

Booklet Free

To the GRESHAM PUBLISHING COMPANY,

34—5, SOUTHAMPTON STREET, STRAND, LONDON, W.C.

Please send me the illustrated descriptive booklet dealing with "MODERN RAILWAY WORKING," and particulars of your special plan of purchase.

Name .....

Address .....

.....

R.M. Please use this form or copy on a postcard, mentioning this Magazine.

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

Digitized by Google

UNIVERSITY OF ILLINOIS-URBANA
3 0112 111148075

Digitized by Google